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CONSUMERS' RESEARCH BULLETIN

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This number is one of 4 *Bulletins* issued during the year by Consumers' Research which are not confidential. This *Bulletin* may be freely discussed with friends. We hope that you will use the opportunity to show them what CR is doing for consumers. ¶The *General Bulletin* is available not only to individuals, but to libraries, schools, and other groups, at $1 for the subscription year October through June. The next non-confidential issue will be the April 1939 number. ¶Responsibility for all specific statements of fact or opinion at any time made by Consumers' Research lies wholly with the technical director and staff of the organization. ¶Please send notice of any change of address at least two weeks before it is to take effect, accompanying your notice with statement of your previous address. Duplicate copies cannot be sent to replace those undelivered through subscriber's failure to send advance notice, except at the regular price for orders of such material as back issues. N.B.—For a detailed account of CR's early history, policies, and information as to the answering of special inquiries about commodities, subscribers are urged to read the *Introduction to Consumers' Research*, which is sent to anyone without charge.

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Off the Editor's Chest

CR has often observed and commented on the fact that consumers sometimes hold ideas about the prices charged for goods which do not at all match the price ideas of the manufacturers and sellers of the products. An interesting illustration of how prices are actually determined in practice appears in *Air Conditioning & Refrigeration News* of December 7. The journal complains of "the unpleasant fact that price-cutting has destroyed some of the pride which present and prospective purchasers of electric refrigerators have taken in their possession." "Pride of Possession," says this magazine, "was for a long time the major appeal in the purchase of an electric refrigerator." The journal goes on to lament that the "fire-sale type of advertising and cut-price selling" have tended to reduce the potency of Pride of Possession as a means of holding up refrigerator prices. It asserts that P. of P. is an attribute which it "is worth a considerable price to regain," and one way in which this can be done, it develops, is to "boost the price level.... There is still time for the industry to regain control of its sales and price schedules" it appears, for the 1939 selling season.

That this is not an unrepresentative attitude is well illustrated by another trade journal article, in *House Furnishing Review*, which points out the unwisdom of "selling gas ranges on price appeal only ... when through the same methods used with such success in selling other major appliances the average price of gas ranges could be raised to $99.50 and the purchaser *be made glad to pay the higher price.*" [Italics ours—CR.]

These expressions of industry's point of view do not at all reflect the concepts of a system of competitive private enterprise, in which the natural and expected economies in manufacture and distribution are to be reflected in steady if not yearly price reductions on most important goods; consumers will fairly doubt whether, by and large, businessmen in certain major industries really *believe* in a competitive system (to which, of course, they make laudatory reference in speeches and general articles).

CR is strongly and frankly for the economic freedom of action by enterprisers and of choice by consumers which goes with a system of private competitive industry, but on all too many occasions it has seemed to us vital to the future of "capitalistic" enterprise in America that businessmen come back to understand the essential bases of operation of competitive industry and to give actual rather than lip service to the virtues of competitive production and selling. It is to be hoped, for the sake of American industry, that wise business generalship may yet discover that the worst enemies of competitive industry are not *all* in the New Deal, or even in a "senatorial" monopoly-investigating Committee (which is one-fifth Senate and four-fifths New Deal-executive).

The person who is charged 15c instead of 5c for 2 ounces of precipitated chalk, or is asked to pay $20 to $50 extra for his "Pride of Possession" in an electric refrigerator or a gas stove, should give his custom to stores whose price level is more in accord with his pocketbook. More stores will have such price policies when—and only when—more consumers say frankly: "I'll not buy it here, your price is too high." That is what the economists used to call "keeping the enterpriser's nose to the grindstone of competition"—not a lazy man's method of doing business, to be sure, but a method—indeed the only method—which can guarantee economic progress and diffuse its benefits. Only a competitive enterprise system serving alert, informed, "reactive" consumers, can guarantee that economies of production and distribution shall be made generally available and not utilized to the sole and special advantages of the management and ownership of trade and industry. F.J.S.

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AN ENGINEER LOOKS AT 1939 AUTOMOBILES

So far as concerns comfort and appearance, competent judges consider that the cars for 1939 are, with a few exceptions, the most satisfactory so far produced. As to mechanical improvements over the cars of 1938, few of consequence have been made. It might be asserted that the improvement in appearance largely grows out of the fact that the lines of the *Lincoln Zephyr* have been copied with more or less fidelity by most other makers. Packard retains its angular but distinctive hood, but there are rumors of a smaller "6" to come, with a front end in keeping with the modern trend. Graham makes no change in its distinctive front end, which is unique and by this writer thought to be attractive. Nash has adopted a combination of this and the *Zephyr*, with good results. Willys has revived the name *Overland* and given the car of that name a nose somewhat on the *Graham* type.

Narrow running boards have also been copied in several instances together with a tendency toward wider bodies. *Oldsmobile* cars are supplied with or without running boards on some models. Those without the running boards seem wider, due to optical illusion. In reality the narrow running board is more of a side bumper than a step. The new *Zephyr* covers the running board with an extension on the bottom of the door, ostensibly to keep the running board clean so that milady's evening gown will not become soiled if dragged across it. Its disadvantage seems to be that any side collision, however slight, will be taken by the extension on the door and be much more expensive to repair than on the old model. (It is astonishing, when one comes to think of it, how a trifling accident nowadays to the body and fender work of a car can run up a shockingly big repair bill. The consumer pays plenty in upkeep for wide, overhanging, bulky-looking fenders and wheel skirts, and many yearn for the days when a fender dent could be straightened out by a mechanic and would not require a high-priced specialist.) *Zephyr's* running board and vertical grille bars instead of the horizontal ones are its main changes from last year, except for the hydraulic brakes which Ford now uses on all cars excluding the *Lincoln V-12*. Regardless of comparative engineering merit, the public has been so sold on the convenience and comfort of the hydraulic braking system, that there was nothing for the majority of manufacturers to do but to adopt this system.

The use of the same bodies on a number of General Motors' cars of different names is more noticeable this year than ever before; nothing but a card index system can keep track of the way in which bodies are interchanged between the various lines. The dies which form some of the bodies are used for three different cars, which is of course good engineering, but rather puts a crimp in the salesman who tries to tell you about the bigger body with better lines on his car.

Beginning at the front ends which have gone *Zephyr*-ward in appearance, *Studebaker* is thought by this writer to be the most attractive, and *Buick* the least. The location of the *Buick* headlights on the fender catwalk has spoiled what might otherwise have been rather a good-looking car. Hudson has made an excellent compromise in appearance, especially in the Model 112, which has much to commend it. The *Terraplane* is no more, all the Hudson cars being *Hudson* this year. One good feature of the *Hudson* is the locking of the hood from inside the car.

Independent wheel suspensions have appeared as standard equipment on the *Plymouth* and *Dodge* cars, and Chevrolet has replaced the *Dubonnet* type with the so-called wishbone design that has proved most popular and is made in several designs. This leaves the *Bantam*, *Willys*, *Overland*, *Chevrolet Master*, *Hupmobile*, *Nash*, *Graham*, *Hudson*, *Ford*, and *Lincoln* cars the only ones without knee-action springs. Ford engineers claim that the transverse springs on *Fords* and *Zephyrs* give similar results without the complication of numerous joints to be lubricated and to wear, an argument that, in this writer's opinion, should be given a good deal of weight, especially when one considers what an accident—even a minor accident—can do to the delicate and complicated joint structure of knee-action suspensions.

Attention is being given by several to control of steering in case a front tire blows out. Hudson has what it calls an auto-poise, while others use sway bars, and Bendix makes an attachment for the same purpose (one engineer considers the latter of doubtful advantage). All who have seen cars ditched as a result of front tire blowouts realize the importance of attempts to improve the situation respecting the effect of sudden tire failures. Goodyear's answer to the problem is the *Life-guard* double tube, which lets air out slowly enough to permit the car to be brought safely under control before the tire has gone completely flat.

Shift levers are now disappearing from the floor of the front compartment and are being mounted on the steering column. This has taken place as a standard equipment item in nearly all cars except the *Ford*, *Lincoln*, *Graham*, *Nash*, *Plymouth Road King*, *Chevrolet*, *Bantam*, *Overland*, and *Willys*; in several of these cars it is available at extra cost. Most of the changes in shifting devices have been of a strictly mechanical nature through the use of levers, links, and Bowdoin[1] wires to transfer the motion from the handle on the steering wheel to the transmission case, now remote from and out of line with the gear shift lever. The exception is the *Chevrolet Master De Luxe*, which has

[1] Bowdoin wires are wires confined in flexible tubes to permit giving either a push or a pull to a distant mechanism or lever.

an option of a booster cylinder that does 80 percent of the work when the engine is running, taking its power from the suction of the intake manifold. The *Chevrolet* system has the advantage that, in case of necessity, it permits the gears to be shifted entirely by hand (though in that event, much greater effort is required). These types of gear shifts largely follow the *Pontiac* model of last year. It is a real advantage to clear the shift lever from the floor, especially now that we have wider front seats able to carry three comfortably, but the advantage has not been achieved without some drawbacks, for there are more parts to wear and develop lost motion, and the shifting does not seem as easy or comfortable as with the old lever shift. The *Zephyr* method of last year, continued this year, which put the lever entirely out of the way by a sort of corkscrew bend, has the advantage of simplicity and retains the old familiar shifting motion.

The construction of the transmissions varies with different cars but all are easy to handle. *Oldsmobile* is the only one with automatic transmission which has been improved to make the shift from third to first gear less abrupt as the car slows down. This, however, requires the use of a hydraulic accumulator that effects a slower drop in oil pressure to secure a gradual engagement of the planetary gear sets and, incidentally, adds another complication to the device which already had 300 parts and 33 gears; this is probably one more reason why the $5,000,000 plant built to make these transmissions might turn out to be an expensive investment.

One revolutionary development in transmission is that of Chrysler, which is this year, for the first time, using the Sinclair fluid flywheel or hydraulic clutch in the custom-built *Imperials*. This device, though new in America, has been used very successfully in England over quite a long period. It consists primarily of an impeller on the engine shaft opposite a similar set of vanes on the drive shaft. Both are enclosed in a steel case with the cover welded in place. The vanes of each set are about ¼ inch apart and the case is filled with a light oil. As the crankshaft turns it throws oil to the outside of the case by centrifugal action, but not enough, at idling speeds, to turn the drive shaft. As the motor speeds up, more oil is pumped than can be bypassed and the drive shaft starts to turn. Car speed can be controlled entirely by engine speed without the use of the transmission except when one needs to go into reverse. Those who have driven with the new transmission say that it is very smooth in action, increases gas mileage, and is very easy on tires owing to the smooth starting. Similar devices have been tried in this country at various times for the past fifteen years but none has proved so startlingly successful as to be adopted—or they may have been ahead of their time.

Overdrives are increasing in popularity. One of the most popular seems to be the Warner Gear drive, which is used in the *Chrysler*, *De Soto*, *Graham*, *Hupmobile*, *Nash*, *Packard*, and *Studebaker*. This gear engages automatically at from 25 to 30 miles per hour and formerly could only be disengaged by dropping below that speed. As now made, however, the driver can disengage it at any time by depressing the accelerator pedal to the floor; the gear will then not return to high until the driver releases the accelerator. This arrangement overcomes the objection of not having maximum power available through the use of a lower gear or normal third speed for passing another car.

Ford offers the *Columbia* overdrive axle on both *Ford* and *Zephyr*, as an extra. When put on at the factory, the speedometer and odometer drive from the rear axle in order to show correct speed and mileage. If put on in the field, there is a compensating unit attached to the speedometer head that is controlled by the shifting from the regular gear to overdrive. This overdrive is manually controlled by a dash button and can be thrown in or out at any speed. As it gives two axle ratios it really gives six forward speeds and two in reverse, for it can be used with the transmission in any gear.

Overdrive is an extra on all cars. Its advantages are not nearly so great as the average consumer will be likely to assume. They depend on the kind of driving to be done (the proportion of city to country driving, particularly) and on the length of time the owner is likely to keep the car. The object of overdrive is to slow down the rotational speed of the motor in relation to the rotational speed of the driving wheels (the same in effect as though the car had been equipped with much larger wheels). In driving in fairly level country, this change reduces gasoline and oil consumption and motor wear, and lessens vibration, giving a smoother ride. Overdrive will probably give about three extra miles per gallon in most cases; though this seems like a big saving, it is well to remember that it takes a lot of driving to save $60 to $80 in gasoline and oil even for a person who does a good deal of open country driving and expects to keep the car for several years in order to get his value out of the additional investment.

The possibility of again manually controlling some motors recently transferred to automatic spark control, is again appealing to many, as is indicated by the use of a manual spark control on the *Chrysler Imperial*. In this car, in addition to the automatic spark control, there is provision for manual control of spark advance on the dash, where it belongs. By this means, the spark may be changed at will to suit the octane number of the fuel in the tank at that time.

Safety has received considerable attention in the new cars both in the way of better vision and in the absence of projecting knobs and handles, which can cause injury in case of accident, but this year's cars still leave much to be desired. Windshields are larger by as much as 20 percent, in some cases, over last year's models, and the wider bodies put the corner posts farther apart. The driver's position is relatively the same regarding the left post so that vision at this point is not much improved. There will still be plenty of reason for careful driving as

the best means to safety. Buick is featuring a direction signal on the trunk door to show the man behind which way a turn is to be made. This is operated by the driver with a small lever on the shift handle under the steering wheel.

There are still wide variations in body upholstery' which is one of the things the average buyer knows least about. Inner-spring mattress construction is used in many cases. Hudson has adopted the cellular rubber type of seat and back on some cars, and this can be obtained on even the lowest-priced *Hudson*, the 112, as an extra. The cellular rubber seat construction is a form of honeycomb structure that has been used for mattresses and bus and theater seats to some extent for some time, but has never come into general use. In this writer's opinion, it should offer some real advantages. It is not pneumatic in its action, so that punctures cannot occur.

With the exception of the larger and higher-priced cars, all have followed the *Zephyr* trend at the rear, commonly known as streamlining. Few, however, have adopted the *Zephyr* narrowing of the tail, which still gives it a distinctive appearance. The reason given is that narrowing the rear reduces the trunk width. All have ample trunk space, however, for the average driver.

Spare tire storage leaves much to be desired in most cars. Following Studebaker of several years ago, many, including Ford, now put the tire in a vertical position behind the back seat, where it is out of the way and makes more trunk space available. In case of puncture, however, it is necessary to remove all the baggage to get at the tire. This objection is overridden by the salesman who tells you, and truly, that you seldom change a tire these days. But one experience in a storm is all that is necessary to make any driver lose all his religion. Hudson has solved the problem nicely this year by putting the tire at the side of the trunk. All tires in trunks are apt to be neglected when it comes to keeping them filled to running pressure, and nothing is more maddening than to find a spare tire soft when you need it.

Protuberances to house the trunk remain on most of the high-priced cars, the probable reason being that the numbers built do not warrant the cost of new body dies. Then too there is probably some selling point in not following the trend of the lower-priced cars.

Chrysler has developed a new method of finishing surfaces with a bearing contact. It may be called a refinement of honing, which produces a surface so smooth that the oil film is better retained between the surfaces and wear is reduced by a very appreciable extent. Owing to lack of production equipment, this is at present confined to the *Chrysler* and *De Soto* lines, but it will later be applied to *Dodge* and *Plymouth*. Strange to say, the cost of finishing is no more than by the old method, when the proper machinery is available. It should increase the life of the bearings of a car to a considerable degree.

"Air conditioning," stressed by Nash last year, has been taken up by Studebaker with quite an elaborate system of heating, filtering, and distributing air throughout the car. Of course, neither of them is air conditioning in the proper technical use of that term. Both systems are worked out rather well, however, and should help to distribute the heat evenly in the winter. For summer driving, a refrigerating unit would be bulky and costly, possibly quite out of the question from the cost of operation standpoint for average car users. The so-called air-conditioning units cost about $30 and are in the "extra equipment" class.

Chrysler has adopted the rotary door lock (formerly used only by Studebaker), which has many advantages. Non-backing devices for holding a car on a hill without calling for use of the brake can be had as extras on several cars. First brought out as the *No-bak* by Stutz some years ago, this device has not had the attention it deserves. Those who have to deal with traffic lights on hilly streets will find it convenient. Its action can of course be cut out when desired.

The 116-inch wheelbase of Ford's *Mercury* places it between the regular *Ford* and the *Zephyr*, which it resembles in many ways without being a copy. A *V-8* engine with 1/8 inch larger bore gives it 10 horsepower more than the *Ford V-85*. One report is that it is the same cylinder block cast with a larger core and bored 1/8 inch larger. There are also rumors that the entire Ford line is to have hardened steel cylinder liners inside the block. This is now being done to some extent in the motors rebuilt by Ford so that standard pistons can be used in all cases. With this practice generally adopted, it would seem logical to use the same block for both 85 and 95 horsepower engines with simply a different liner.

Without a perfect contact between liner and cylinder wall the cooling might be adversely affected. But *Ford* and *Zephyr* motors all run cool so that this is probably not a problem. Liners are not new in motor car work. General Motors' trucks had cylinder liners years ago, and the *Marmon 16* with aluminum cylinder block used a steel liner with the water on the outside. ¶Ford follows the sensible practice of getting two years' wear out of front end dies by making this year's standard model's front end the same as that of last year's De Luxe models.

AN ENGINEER SUBSCRIBER

Scale-Model Railroads

MODEL RAILROADING has been a popular hobby for many years, but only recently, due to the increased interest in all hobbies, has the large number of model railroaders come to light and publicity—and this publicity has attracted many new enthusiasts. It has been estimated that forty to fifty thousand adults in the United States now actively participate in model railway designing, building, and dispatching. A great advantage in this hobby is that it can be as complicated and expensive or as simple and reasonable as one desires, and those who can build much of their own equipment can have an extensive layout at moderate cost. To the uninitiated, model trains mean the tin-plate toy variety sold in the department stores at Christmas time for children. Scale models are nothing like so simple as these, but the systems can, nevertheless, be so elementary in construction that a ten-year-old boy can understand and operate them without difficulty. At the other extreme we find large club projects running into hundreds of dollars' worth of equipment, representing outlays larger than any individual member would care to undertake. Some such projects can become so complicated and embody such careful attention to perfect reproduction of minute details that they require the services of mechanical and electrical engineers to solve some of the problems presented in their construction. One club had such a positive feeling for railway atmosphere that it even used an abandoned railway station for its clubhouse! (It is to be wondered whether they may burn a little soft coal occasionally in order to get the peculiar sulphurous aroma of the railroad yard to complete the picture.)

Although in model railroad building there is a variety of gauges and scales, ranging from the outdoor live-steam passenger-carrying narrow gauge railway to the miniatures scaled 3.5 mm (about 1/8 inch) to the foot, the novice should probably confine himself to one of the two most common gauges—"O" or "HO." The choice between these two depends upon the amount of money one wishes to spend and the space available for the layout. Space required for a comprehensive layout in "HO" gauge would be approximately 10 x 20 feet. This allows sufficient room for a fair-sized continuous-running track together with the necessary space for sidings, storage tracks, and some buildings and scenery. However, portable layouts for use in small homes or apartments can be constructed and mounted on heavy plywood so that they may easily be placed in a closet when not in use. Satisfactory and interesting model railroads have been thus mounted on a space as small as 4 x 6 feet. Of course an attic, cellar, or spare room is much more desirable. People who have more interest in building models than in operating them, require only a bridge table or other handy piece of furniture.

"O" gauge size requires about four times as much space for a given layout as "HO," as the length and width of each piece are about twice that of "HO"; it is, therefore, entirely out of the question for people living in apartments. It requires a large room or, better, an attic or cellar to accommodate it, so that the present trend seems to be for this gauge to be used mostly by clubs where large space is available. "O" gauge track is 1¼ inches between rails, as compared to 16.5 mm (5/8 inch) for "HO." Freight cars in "O" gauge are about 10 or 11 inches long and Pullmans about 20 or 21 inches. In "HO" the freight cars run from 5 to 6 inches in length and Pullmans about 11 inches. The size of locomotives in either gauge varies greatly and depends upon the type used.

Probably the best way to start model railroading is to buy a kit of freight car parts, which, for a "reasonably well detailed and good running car," retails for about $1.25 in "HO" gauge and for about $3.50 in "O" gauge. The next step is to buy 100 feet of rail. In "HO" gauge the cost is about $2 for 100 feet and in "O" gauge about $3. Ties can be made from cigar box wood, small sticks, etc., or bought at a reasonable price already cut and stained.

The largest expense is the locomotive. Kits of parts for a locomotive in "HO" gauge, which can be easily assembled with simple tools, may be purchased from $25 up. Parts can also be purchased piecemeal or in separate sections at a slightly increased price. In "O" gauge, locomotive kits range from $50 up. As a temporary expedient when initial cost is important, a toy "O" gauge tin-plate locomotive may be used by having its wheel flanges turned down (at a small charge) to operate on three-rail scale "O" gauge track. This change is essential as the wheel flanges on tin-plate locomotives are too large to pass through scale-model-switch flangeways.

The two-rail system of operation is recommended in preference to the three-rail, both for the sake of realistic appearance and for some simplification in construction and operation. The usual-type three-rail system for scale-model railroads has an outside third rail, similar to that used on the electrified divisions of the New York Central Railroad, subway lines, etc., with a shoe or flexible friction contact projecting from the side of the locomotive to carry current to the motor. This method often provides poor contact at crossover switches or wherever a low spot occurs in the third rail. Considerable extra installation work, material, and cost, etc., are also involved when it is used.

It is customary to operate the "HO" gauge systems on 6 volts, and the "O" gauge systems on from 12 to 18 volts, of direct current, obtained by connecting to the customary 110-volt alternating house current an appliance called a transformer-rectifier unit. With this system, one rail is positive, the other negative; by changing the polarity, the locomotives can be reversed from a remote point. The cost of such a transformer-rectifier unit may run from $7.50 to $14.00. Storage batteries may also be used as a source of power. It is advisable to install a disconnecting-relay, or circuit breaker,

as a precaution against burning out the rectifier when short circuits occur. A circuit breaker may be purchased for two dollars or so, or, if one is mechanically inclined, may be constructed in a couple of hours very cheaply. In a few districts and cities there will still be direct current available which can be used, though not as economically as alternating current, by putting a suitable control resistance in series with the motors and relays. Inasmuch as model railroads are often built and operated as father-and-son projects, and because of their fascination for children, it is advisable to purchase a rectifier that is so constructed that a child could not possibly, through accident, come in contact with the 110-volt part of the equipment. The low voltages on the "output" side of the rectifier used to run the trains and operate the various signal and switch mechanisms are comparatively harmless, except in case of a short circuit, when enough heat may be generated to burn the fingers, or in case of leakage or breakdown between primary and secondary of the transformer (which eventuality can occur, though rarely, especially under conditions of dampness or abuse).

Considering all the foregoing, the approximate final cost for a relatively simple layout, materials and one train consisting of a locomotive and 10 cars, in "HO" gauge would finally amount to approximately $50. In "O" gauge the same equipment would run to about $100.

After purchasing kits of parts for two or three cars, anyone with a little patience and model-building ability can easily make his own cars from odd pieces of metal and cardboard by following some of the numerous articles on the subject in such magazines as *The Model Railroader* and *The Model Craftsman*. The only parts necessary to buy would be the trucks and some of the miscellaneous hardware, which would amount to about 75 cents to $1.50 per car, depending on the gauge. Locomotives, too, may be built by those handy with tin snips and a soldering iron, the only commercial parts necessary being the wheels, gears, and motor. These should not cost more than $5 or $6 in either gauge.

If you should become or are interested in this hobby and cannot locate an experienced person when you need help to work out your problems, the National Model Railroad Association will be glad to give you the addresses of hobbyists or clubs near you. Write to the present secretary: Mr. W. L. Tomlinson, 15474 Ashton Road, Detroit. This association is composed of about one thousand of the country's leading model railroaders, who hold a convention each year to discuss model railroad problems and standards. It is through the efforts of this group that the products of most manufacturers have come to be interchangeable, so that you can have the pleasure of taking your models to a friend's house and running them on his layout and with his equipment.

There is a monthly magazine devoted entirely to this hobby: *The Model Railroader*, 7611 W. State St., Wauwatosa, Wis. (20 cents per copy; subscription $2 per year, 12 issues). This magazine carries the advertisements of important manufacturers and dealers. Another magazine devoting much space to model railroads is *The Model Craftsman*, published by Model Craftsman Publishing Corp., 34 N. Crystal St., E. Stroudsburg, Pa. (25 cents per copy; subscription $2.50 per year, 12 issues).

Many model railroaders, particularly those who live in apartments and who lack room for their own layouts, either join a club or join forces with another "fan" who has room. Many towns of over twenty thousand population have a club. Some of these clubs are well known; often there are write-ups of their doings in the local newspapers.

Making and Operating Model Railroads, by Raymond F. Yates, Appleton Century Publishers, N.Y.C., is a 315-page book ($3) which covers building and assembling of trains and equipment. It has many good photographs and drawings, and will be found to be interesting and helpful.

We are listing below some of the manufacturers and dealers in two popular gauges. Hobby stores and many large department stores carry model railroad supplies, and all manufacturers have mail-order service.

The following listings are not to be taken as CR's recommendations of the manufacturers or their products, but are a list of the best-known makers compiled by an enthusiastic railroad hobbyist who has given the subject careful study and has had wide experience with the types of equipment offered. In issuing this list for the convenience of interested subscribers, however, CR wishes to point out that it cannot assume responsibility for the quality of the products or the reliability of the makers.

Manufacturers of "O" Gauge, Scale ¼ inch to 1 foot

Carl Auel Industries, Irwin, Pa. Rail and car trucks.
Congress Tool & Die Co., 9016 Lumpkin Ave., Detroit. Passenger cars (kits or assembled).
Hawk Model Co., 3530 W. Fullerton Ave., Chicago. Passenger cars (kit form).
Icken Model Locomotive Co., Palisades Park, N.J. Locomotive assembled (ready to run).
Model Railroad Shop, 292 Vail Ave., Dunellen, N.J. Full line.
Parmele Sturges, Inc., 51-R Crown St., New Haven, Conn. Electric locomotive (kit form).
Rollin M. Lobaugh, 1179 Howard St., San Francisco. Full line.
Scale-Models, Inc., 1516 S. Wabash Ave., Chicago. Steam locomotive (kit form).
The Westbrook Co., Hasbrouck Heights, N.J. Freight car bodies.

Manufacturers of "HO" Gauge, Scale 3.5 mm to 1 foot

Conover Miniature Railroads, 23 Croton Ave., Tarrytown, N.Y. Locomotive kits.
F. M. Joslin, 217 Mt. Vernon Ave., N.W., Grand Rapids, Mich. Switch parts.
Model Craft Mfg. Co., 3459 W. Sixth St., Los Angeles. Freight cars (kits) and freight car trucks.
Model Railroad Shop, 292 Vail Ave., Dunellen, N.J. Full line.
Varney, 7475 Melrose Ave., Hollywood. Locomotive kits.
Wm. K. Walthers, 231 E. Erie St., Milwaukee. Passenger cars (kits).

MUSLIN SHEETS AND PILLOWCASES

Ten Brands Tested

MEN HAVE ENTERED SHEET ADVERTISING! Had you noticed it? A year or two ago, the woman of the household was pictured as the "super-shopper" who determined which brand of sheet should be purchased, and if a man appeared at all, he was a hazy sort of individual who asked: "They're all just about alike, aren't they?" In the present advertising, mere man appears to be dominating the sheet situation and readers of advertising are being treated to all sorts of intriguing domestic scenes: the brand new husband thinks perhaps the bride's sheet purchases (her hope chest was short on sheets) may be too luxurious for his modest salary and she has to assure him as to their true economy; Pequot is learning from wives (bedroom scene) which sheets men like; after the week-end visit, friend husband mentions in the automobile on the way home that his hostess "had something" in her *Cannon* percale sheets.

Now maybe the advertising boys know what they are doing, but it is our not too private opinion, based on a good many years' experience in male reactions to household textiles in general, that any woman could "Pamper the Brute" (Pequot's phrase!) for years with *Pequot* sheets and pillowcases and then change over to *Utica* or *Fruit of the Loom* or even the lighter-weight *Mohawk*, and the "brute" would never know he wasn't being "pampered" any longer. To men, the distinctions between sheets of well-known brands lie among those higher overtones of family living that often escape male perception entirely. So, ladies, you'd better go back to winning him with steaks and chops and the other substantialities of men's lives.

But there are *practical* differences in sheets as to the economy of their use, per year of service, and the woman buyer who wants to get the most for her sheet dollar should be provided by the manufacturer with labels which give sufficiently adequate information to enable her to make a wise choice. This labeling should apply to the finished product and not, as is now often the case where any information is furnished the consumer at all, to the manufacturer's "gray goods," i.e., the raw fabric before it is bleached and finished into sheets. Suggested specifications for five general classes of sheets were given in the September 1938 *Annual Cumulative Bulletin*. These values, determined by Ruth O'Brien and Margaret Hayes as reported in the *Journal* of Home Economics, January 1937 (all figures on the basis of the finished sheet) are repeated here to make intelligent reading of this discussion easier.

The acceptance by the trade of these standards for the suggested classes would be an excellent initial step toward taking unnecessary mystery out of a very simple business.

Type of Material	*Threads per in. minimum*	*Weight oz pr sq yd*	*Tensile Strength lbs minimum*
True percale	200 (warp + filling)	3.8 max.	60
Fine count muslin (sometimes called "utility percale")	86 x 82	3.7 - 4.0	60
Heavy-weight muslin	74 x 66	4.6 min.	70
Medium-weight muslin	70 x 60	4.2 "	50
Light-weight muslin	60 x 52	3.7 "	40

Heavy-weight muslin sheets unquestionably have the longest wear-life of all types of sheets, closely followed by good medium weights. In these two classes there is some overlapping in the warp-wise thread counts but the classes are distinct because of the difference in the filling-wise thread counts. Medium-weight sheets are somewhat easier to handle in laundering than the heavy-weight sheets and somewhat cheaper to launder either at home or at a commercial laundry, and are preferred by some housewives on this account. Lightweight muslin sheets should receive no consideration for general household use; most of them contain large amounts of sizing in order to conceal their low thread counts (open weave). True percale sheets and fine count (close-woven) muslin sheets, though light in weight, are entirely different products from the weak and loosely woven lightweight muslin sheets. True percale sheets are made of combed cotton yarn and have a thread count of at least 200 (warp plus filling). Fine-count muslins are made to resemble closely true percale and are usually sold as that or as "utility percale" by their manufacturers. As they do not have as high thread count as true percale sheets, are often made of carded instead of combed yarn, and are otherwise low in quality, they are not as satisfactory as true percale and may be a definitely low-grade product. No purchases of percale sheets should be made without first determining whether or not the thread count meets the proposed minimum just mentioned.

There is no excuse for any significant amount of sizing in sheets; a fraction of 1 percent is desirable and one reliable authority states that the percentage should run under 4 percent in any case. When inquiring into the weight per square yard, it is important that the percentage of sizing be known, for a heavy sheet with a high percentage of sizing may actually have less cotton in it than a somewhat lighter sheet with no sizing. Sizing, in other words, is used as a make-weight, or adulterant, to deceive purchasers. Unfortunately, even the manufacturer's label cannot always be trusted as to the amount

of sizing. The label on the *Cannon* sheets purchased for CR's test stated that the sheets have "permanent white finish ... free from 'loading' ...." The pillowcase label of the same brand said, "free from sizing or filling." Yet in the test, the sheet was found to have 5.38 percent sizing, and the pillowcase, 3.25 percent. Sears' *Lady Fair* sheet label stated that the amount of sizing does not exceed 3 percent, but the actual amount of sizing found in the *Lady Fair* sheet was considerably above the limit claimed.

Hems should be straight and well stitched. (Government sheet specifications state that the machine stitching in the hems shall have not less than 14 stitches to the inch.) Hemstitched hems are distinctly impractical, as hemstitching adds considerably to a sheet's cost and detracts greatly from its wear-life. For longest wear, the yarns should be manufactured from long staple cotton. A sheet made of such yarns will have a smooth appearance when a fold is held against the light, though a highly sized (loaded) sheet will also give the appearance of smoothness. (Sizing will come out and be visible as a fine white powder if the sheet is held over a dark material and rubbed briskly.) If the folded sheet presents a fuzzy appearance, the use of the lower-grade, less durable, short-fiber yarns is usually indicated. First-quality sheets should be free from blemishes and should have no unevenness in the weaving, nor rough spots. If a sheet is second quality, this fact should be clearly stated on the label, and the purchaser should examine the sheet with great care to determine the type of flaw which makes it a "second." The price of a second should be considerably below that of a first-quality product.

The actual torn length of sheets is often skimped, as may be seen in the listings; this is indicated wherever it occurred in the sheets purchased for test. Price apparently had nothing to do with the amount of skimping done, as even the expensively advertised *Lady Pepperell*, the highest-priced sheet tested, was torn short of the 108 inches claimed.

The amount of shrinkage to be expected should also be an important factor in sheet purchasing, and the prospective buyer has a right to know whether, after it is washed, she will have practically as large a sheet as she started with, or whether she will perhaps have only about nine-tenths of her original sheet, as was the case with the Montgomery Ward sheet in CR's test. Bringing up the finished size by excessive stretching in the process of manufacture, which is sometimes practiced, will of course caused excessive shrinkage in the finished product. A pulled and strained appearance of some of the threads may indicate excessive stretching.

All the information implicit in the foregoing discussion should be on sheet labels and would be if consumers became vociferous enough in their demands. The Consumer-Retailer Relations Council has discussed the adoption of sheet labels and the various items of information that should be included on them. Consumers desiring further information about this proposal should get in touch with this organization at 8 West 40 Street, New York City.

In CR's recently completed test on sheets, only heavy- and medium-weight muslin sheets were included because these are most commonly purchased.

Points determined in the test were: the actual torn length of each sheet and the width, the weight per square yard, depth of the hems, thread counts in warp and filling directions, percentage of sizing, tensile strength before and after washing five times, and percentage of shrinkage. In rating the sheets, particular weight was given to the amount of sizing, percentage of shrinkage and tensile strength after washing. Sheets were heavy-weight muslin, 72 x 108 inches, torn size, except where otherwise noted; thread counts met the suggested minimum requirements in all brands. Sizing above 4 percent is rated as excessive.

A. Recommended

Lady Fair, Cat. No. 96—1954 (Distrib. Sears, Roebuck & Co.) 92c plus postage. 5.4 oz per sq yd. Amount of sizing considerable, but not excessive. Shrinkage somewhat higher than average but practically no loss of tensile strength in washing. **1**

Utica (Utica & Mohawk Cotton Mills, Inc., Utica, N.Y.) $1.14. 4.9 oz per sq yd. Sizing less than 1%. Considerable loss of warp tensile strength after washing. Warp shrinkage somewhat higher than average but no shrinkage in the filling. **2**

B. Intermediate

Mohawk (Utica & Mohawk Cotton Mills, Inc.) 99c. 72 x 99 in. 4.4 oz per sq yd. Medium weight. Sizing less than 1%. Had highest warp tensile strength of all sheets tested before washing, but loss of warp tensile strength in washing was unduly large. Moderate loss of tensile strength in the filling, in washing. Less than average shrinkage both in warp and filling. **1**

Fruit of the Loom, Extra Weight (B. B. & R. Knight Corp., Providence, R.I.) $1.19. Torn length 106½ in. instead of 108 in. as claimed. 4.9 oz per sq yd. Amount of sizing excessive, otherwise would have been rated *A*. Tensile strength held up very satisfactorily in washing. Number of stitches per in. in hem somewhat low. Shrinkage above average in the warp, and in the filling was highest of all sheets tested. **2**

Pequot (Pequot Mills, Salem, Mass.) $1.14. Torn length 106¾ in. instead of 108 in. as claimed. 4.7 oz per sq yd. Sizing less than 1%. Considerable loss of tensile strength in washing, both in warp and filling. Less than average amount of warp shrinkage; practically no filling shrinkage. **2**

Lady Pepperell (Pepperell Mfg. Co., Biddeford, Maine) $1.49. Torn length 107¼ in. instead of 108 in. as claimed. 4.6 oz per sq yd. Amount of sizing just over 1%. Warp tensile strength somewhat low after washing, but filling-wise strength was satisfactory. Warp shrinkage less than average; filling shrinkage slightly greater than average. **3**

C. Not Recommended

Cannon Fine Muslin (Cannon Mills, Inc., N.Y.C.) $1. Torn length a trifle short of the 108 in. as claimed. 4.5 oz per sq yd. Medium weight. Had highest amount of sizing of any sheet tested. Tensile strength in both directions lowest in the group both before and after

C. Not Recommended (contd.)

washing. Shrinkage warp-wise above average and next to the highest of the sheets tested; shrinkage in the filling about average. The label on this inferior sheet assured the purchaser that "The Cannon Label is Your Guarantee of Tested Quality on Sheets just as Sterling is on Silver" and that the sheet was "first quality, triply inspected and rigidly tested." **1**

Penco (Distrib. J. C. Penney Co. chain stores) $1. 81 x 99 in. Torn length 96⅝ in. instead of 99 in. as claimed. 4.9 oz per sq yd. Amount of sizing considerable but not excessive. Tensile strength low in both warp and filling after washing, indicating short wear-life. Number of stitches per in. in hem somewhat low. Shrinkage less than average in both warp and filling. **1**

Treasure Chest Supreme Quality, Cat. No. 16—9855 (Distrib. Montgomery Ward & Co.) 92c plus postage. Torn length a trifle short of the 108 in. claimed. 5.1 oz per sq yd. Amount of sizing appreciable but not excessive. Tensile strength fairly good after washing. Warp shrinkage was over 9%, which accounts for *C. Not Recommended* rating: otherwise would have been rated *B*. Shrinkage in filling less than average. **1**

Pioneer (Distrib. Cooperative Distributors, Inc., N.Y.C.) $1.11 plus postage. Torn length 104 and 5/16 in. instead of the 108 in. claimed. 4.9 oz per sq yd. Excessive amount of sizing. Tensile strength in filling direction unduly low after washing. Shrinkage in warp less than average; shrinkage in filling greater than average of the sheets tested. **2**

PILLOWCASES

In general, the discussion of desirable features of sheets applies to pillowcases as well. In rating these, particular weight was given to tensile strength after washing and to amount of shrinkage; percentage of sizing was also carefully noted. All pillowcases were nominally 42 x 36 inches; actual torn lengths were found, however, except for *Fruit of the Loom* and *Utica*, to be short of the 36 inches claimed, by an amount which varied from a very small fraction for *Pioneer* to 1⅜ inches for *Pequot*. All, except the *Cannon* and *Mohawk*, were heavy muslin. These two were medium weight. Thread counts in all brands met the minimum requirements suggested for sheets.

A. Recommended

Pequot (Pequot Mills, Salem, Mass.) 28c. 4.9 oz per sq yd. Torn length 34⅝ in. instead of 36 in. as claimed. **2**

Fruit of the Loom (B. B. & R. Knight Corp., Providence, R.I.) 32c. 4.9 oz per sq yd. Tensile strength satisfactory after washing, but would possibly warrant *B. Intermediate* rating because of excessive amount of sizing. **3**

B. Intermediate

Lady Fair, Cat. No. 96—1965 (Distrib. Sears, Roebuck & Co.) 20c plus postage. 5.1 oz per sq yd. Initial tensile strengths in warp and filling were 10 lb and 7 lb respectively below values claimed on label. **1**

Penco (Distrib. J. C. Penney Co. chain stores) 23c. 4.7 oz per sq yd. **1**

Pioneer (Distrib. Cooperative Distributors, Inc., N.Y.C.) 25c plus postage. 4.9 oz per sq yd. Excessive amount of sizing. **1**

Treasure Chest (Distrib. Montgomery Ward & Co.) 20c plus postage. 5.1 oz per sq yd. Would have been rated *A* except for warp shrinkage, which was 7.9%. **1**

Lady Pepperell (Pepperell Mfg. Co., Biddeford, Maine) 35c. 4.6 oz per sq yd. Would have been rated *A* except for filling shrinkage, which was the greatest of any pillowcase tested. **3**

C. Not Recommended

Cannon. 25c. 4.7 oz per sq yd; classified, however, as medium weight on basis of thread count. Tensile strength in the filling unduly low after washing. **1**

Mohawk. 27c. 4.0 oz per sq yd; medium weight. Tensile strength unduly low after washing, both in warp and filling. **2**

Utica. 28c. 4.6 oz per sq yd. Tensile strength in the warp unduly low after washing. **2**

PHOTOGRAPHIC ENLARGER

THE test of the following enlarger was not completed at the time the report on several others was issued in the November 1938 confidential *Bulletin*.

B. Intermediate

Ihagee Projection Luminax (Distrib. Photo Marketing Corp., 10 W. 33 St., N.Y.C.; also Bell & Howell Co., 716 N. La Brea Ave., Los Angeles, and 1801 Larchmont Ave., Chicago) $70 with *Ihagee* Anastigmat f:4.5 lens. Made in Germany. Used 100-watt opal lamp and double condenser. Designed for negatives 2¼ x 2¼ in. and smaller. Negative mask provided in the form of a glass plate with 24 x 36 mm clear opening for the enlargement of 35 mm negatives. Focusing by means of a very smooth-working helical mount. Maximum enlargement on baseboard, stated in booklet of directions to be 4.5 times, was actually found to be nearly 5.5 times. Enlarger head moved on post by a friction drive of exceptional smoothness. Definition good to edges of field. Alignment excellent, rigidity fair. The head could be swung into a horizontal position for projecting color film for viewing purposes. For projection for viewing purposes, however, it is necessary to use a 100-watt clear projection bulb. A better enlarger than many on the market but not considered as desirable as the *Super Multifax* or the *Omega B*.

COMPARATIVE COSTS OF DEVELOPING PHOTOGRAPHIC FILMS

In comparing the cost of processing one's own films with the cost of having them processed by the commercial finisher, consideration should be given to the investment in necessary equipment and the ability of the prospective user to do sufficiently clean and careful work to avoid considerable losses due to spoilage or poor work. The use of panchromatic films, which must be developed in total darkness, makes the use of tray developing methods of no particular advantage unless desensitizing is used. For various reasons also, tank development is favored by many amateurs even for use with slower and non-color-sensitive films. The use of the tank with accurate control of temperature and time will produce a higher average of good negatives than will visual control, particularly in the hands of a beginner, and will especially help to prevent losses of films due to fogging, scratching, and marking of various kinds which take considerable experience to prevent with any degree of certainty. For the amateur who intends to do his own processing, the following may be set down as the minimum essential:

Developing tank of proper size and type for the film used	$3.95 and up
Thermometer	.50 " "
2 graduates, one 16 oz, 500 cc, or larger; one about 1 oz or 25 cc	.90 " "
Stirring rod	.10 " "
2 film clips	.30 " "
2 storage bottles, of amber glass	.40 " "
Darkroom lamp (*Brownie* or *Kodak*)	1.75 or $3.00

In addition to the minimum necessary equipment above, there will be a need for chemicals, including the following: developer, short-stop bath, and fixing bath.

Prepared fine-grain developers in liquid form cost from $1.25 to something over $2 per quart, this amount being capable of developing from about 10 to 40 rolls of 35 mm film in 36-exposure lengths; or an equivalent area of film of other sizes (see table). The cost of the developer may range from about 5 cents to nearly 20 cents per roll of 36-exposure 35 mm film depending on the price per quart of the developer and the number of films it will develop, or in other words, about 1/10 cent to about ½ cent per square inch of negative, a single exposure of the 35 mm size being equal approximately to 1.3 square inches. Some of the fine-grain developers can be bought in the form of dry chemicals at a price about 30 percent lower; the user dissolves them in *distilled* water, the cost of which may be around 10 cents per quart or 25 cents per gallon; or the country-dweller may save snow or rain water, taking precautions to collect it after the precipitation has been going on for a time so that the dust and smoke particles will have been cleaned out of the air. In any event, it is clear that if a high price is to be paid for a fine-grain developer, it will be distinctly uneconomical to use water of unknown purity and so risk losing the benefits accruing from the use of the high-priced chemicals. It should be noted here that the practices of exaggerating the benefits to be obtained from new photographic methods, materials, and appliances prevail also—perhaps one should say especially—in the fine-grain and other prepared-developer fields, and it is well to keep in mind that the differences between developers will, in most cases, be more pronounced in the advertising than in practical use. Actually there is great need for standardization of developer formulas by unbiased technicians based on both convenience of working and photographic efficiency, so as to debunk a field in which confusion and cost to the consumer have greatly increased in recent years. In any event, the consumer will do well not to switch around continually from one developer to another, but to concentrate on a single developer with which he becomes fully familiar.

For the user not demanding the utmost in fine grain—and this will apply to all except those using the very small size films—the various developers of the borax type, such as *Eastman* D-76 and *Agfa* Formula 17, will be found satisfactory. Either is obtainable in dry form at 25 cents for a package sufficient to make a quart of solution. Distilled water, as has been noted, may cost nothing other than a little time or trouble, or up to 10 cents per quart, so that the total cost of a quart of developer ready for use should not exceed 35 cents. Eastman Kodak Co. and Agfa Ansco Corp. do not give in their literature any specific information as to the quantity of film *D-76* or *Formula-17* will develop. A request for information to both firms, by letter, elicited the following on developing capacity in terms of 36-exposure 35 mm rolls: *Eastman* D-76, six or seven rolls per quart; *Agfa* Formula 17, three to four rolls per quart. However, many workers use these developers for longer periods, adding a little "replenisher" from time to time.

The use of an acid short-stop bath between development and fixation is good practice from the point of view of quality of finished results and economy of fixing bath. The short-stop bath may consist simply of 22 cc (¾ fluid ounce) of 28% acetic acid[1] in 16 ounces of water; this amount is sufficient for one roll of film, and is discarded after using once. Glacial acetic acid may cost about 42 cents for 16 fluid ounces (about one pound or 500 cc), so that the amount used for each film will cost considerably less than one cent.

Acid "hypo" (*Kodak*, *Agfa*, or *Defender*) in dry form to make two quarts of standard fixing bath costs 25 cents. This amount will safely fix 50 rolls of 35 mm film or about 3000 square inches of film, provided the acid short-stop bath has been used,

[1] It is cheaper to buy acetic acid in the form of glacial acetic acid. This when used in the proportion of 3 parts of glacial acetic acid to 8 parts of water gives 28% acetic acid used in the formula above. Glacial acetic acid should not be stored in a place where the temperature goes much below 60°F because it solidifies at a temperature of just over 50°F.

making the cost of fixing about one-half cent per roll. If the short-stop bath is not used, the number of films fixed in this amount of fixing bath should not exceed 25 to 30 (1500 to 1800 square inches). Assembling these figures, it becomes evident that the total cost of chemicals for processing a roll of 35 mm film will be less than 6½ cents if the borax type developer is used, and can run as high as 20 cents if the most expensive of the prepared fine-grain developers listed in the table is used.

The amateur who is doing a very considerable amount of work may prefer for various reasons to purchase his chemicals in bulk and mix his own solutions according to formulas published by the manufacturers of photographic materials, and others. This will also necessitate the purchase of a scale for weighing photographic chemicals, a filter funnel, filter papers, etc. Suitable scales will cost from $4.50 up. A variety of graduates in different sizes, and extra stirring rods will facilitate the preparation of solutions. An expenditure of $6 or a little more will provide a reasonable amount of such equipment. A rough idea of prices of the several items, preparatory to buying, can be obtained from the photographic supplies catalogs of large, well-known mail-order dealers. These will give one at least an idea of what price ranges to expect when visiting a photographic supply store, if one lives in a good-sized city where such stores are available.

Standard prices charged by commercial finishers for developing films are about 15 cents for the 8-exposure No. 120 roll,[2] and 35 cents for the 36-exposure roll of 35 mm film. This corresponds to a price range of from ¼ to ¾ cent per square inch of negative area. Prices for fine-grain processing of the same films will perhaps average about 25 cents and 50 cents respectively, or about ½ to 1 cent per square inch. Lower prices may be had, but it would be well to check the quality of the work—the meaning of "fine-grain finishing" will be subject to varying interpretations, since the term was set up by dealers and manufacturers without consulting consumers.

It is certain that the amateur can effect a material saving by doing his own processing, and if he will carefully read the directions provided by the manufacturer of the film, and then follow them with scrupulous attention to time, temperature, and cleanliness, good results will be obtained from the start. Inattention to time and temperature in developing will result in too thin or too dense negatives, difficult to print or enlarge properly in either case; carelessness in fixing or washing will later result in the negatives' becoming stained. Use of impure water or chemicals can result in a wide variety of peculiar ills explainable only by an expert and then, perhaps, after costly, time-consuming study and investigation. It is recommended that unless the amateur has a dependable source of supply of chemicals, known to be of sufficient purity for photographic purposes, he confine his purchases to the products of reliable chemical houses, such as Mallinckrodt, Agfa, Eastman.

[2] This does not consider the many mail-order firms who develop and print any size film for 25 cents. Some of these firms do good work. CR expects in future to list a few of the mail-order finishers whose work, ordered by consumers and examined by CR, has been found satisfactory.

Table Showing Cost of Several Well-Known Fine-Grain Developers for Various-Sized Roll Films, Film Packs, Cut Films, and Plates*

	No. of Exposures	Champlin No. 15 $1.90 per qt	Micrograin 85 $1.30 per qt	Edwal 12 70c per qt * +10c	Panthermic 777 $3 per Unit * +20c	Gamma D $2.15 per qt	Edwal 20 80c per qt * +10c	Champlin 16 $1.50 per Unit * +30c (+ 20c for sulphite)	Fink Roselieve $1.85 per qt	Eastman D-76, 25c per qt * +10c	Agfa 17 25c per qt * +10c
Roll Films		Cost of Developer per *Roll*, in Cents									
35 mm	36	19.0	8.7	7.3	14.5	5.4	10.0	6.3	9.3	5.0	8.8
1⅝ x 2½ in.	8	10.5	4.7	4.0	9.7	2.9	5.6	3.4	5.0	2.7	5.0
2¼ x 2¼ in.	6	9.5	4.4	3.6	9.7	2.7	5.0	3.2	4.8	2.5	4.4
2¼ x 3¼ in.	8	19.0	8.7	7.3	14.5	5.3	10.0	6.1	9.3	5.0	8.8
2½ x 4¼ in.	8	27.2	13.0	10.0	18.8	7.7	14.3	9.1	13.2	7.0	11.6
Film Packs, Cut Films, and Plates		Cost per *Pack* or per dozen *Cut Films* or per dozen *Plates*, in Cents									
2¼ x 2¼ in.	12	19.0	8.7	7.3	14.5	5.5	10.0	6.4	9.5	5.0	8.8
2¼ x 3¼ in.	12	27.2	13.0	10.7	20.6	8.0	14.3	9.1	13.7	7.0	12.7
2½ x 4¼ in.	12	42.2	18.6	16.0	27.8	11.6	22.2	13.3	20.6	10.0	18.4
3¼ x 4¼ in.	12	54.3	23.7	20.0	37.8	14.8	28.6	17.4	26.4	14.0	24.0
9 cm x 12 cm	12	63.3	29.0	26.6	42.7	17.9	33.3	21.1	30.8	17.5	29.2
4 x 5 in.	12	76.0	37.2	32.0	53.3	21.5	40.0	25.0	37.0	20.0	35.0

* In this table, calculations include the cost of distilled water (shown as +10c, etc.) for developers supplied in powder form. But note that calculations are based on developer makers' own claims for quantities of film developed by their products. Where a range of number of rolls was given, the manufacturer's higher figures were used, except where the range was wide; in such cases the average was used.

A Further Report on Gas Ranges

RECENTLY the gas industry has undertaken to improve the quality of gas ranges, which, as CR has pointed out, has long lagged far behind the possibilities of good construction and high burner-efficiency easily available to the industry. The industry has now drawn up a set of specifications for a gas range which are far in advance of those hitherto in vogue. The minimum efficiency of top burners, for instance, has been set at 45 percent, an efficiency much higher, as CR's previous reports have shown, than is given by the usual run of gas stove burners, though it is easily attainable. The present minimum requirement of the American Gas Association for efficiency for top burners is set at only 40 percent; indeed until recently it was as low as 30 percent. The gas range which meets the new higher-quality specifications is to be known as a Certified Performance or C. P. range.

Setting up clear, definite, and well-policed specifications for consumer goods is a fundamentally important, though little-exercised, function of trade associations. All trade associations ought to be doing this sort of work for their respective industries. Indeed, doing so would be useful further in taking their minds off the price-fixing and "industry-stabilizing" activities which form the larger part of the operations of probably a considerable majority of all commercial associations, local, regional, and national. The gas industry has long pioneered in developing appliance standards and tests which have had distinct advantages for ultimate consumers. It perhaps had more than ordinarily good reasons for doing this, for, as electrical energy became cheaper, electrical appliances began more and more actively to compete with gas equipment, and attempts to set up reasonable standards of equipment performance became a practical necessity for the gas industry if it was to maintain its market and so continue to utilize economically its expensive plant and distribution equipment. Needless to say, however, setting up of standards is not all that is required. All too many industries have set up standards and then done nothing about them other than to get what publicity value could be associated with them in the public mind. It is most important that compliance with the specifications should be definitely established by tests conducted by a strictly independent, unbiased laboratory beholden neither to the gas manufacturers nor to the gas-appliance industry.

* * *

The ranges tested by CR were made before the new Certified Performance specifications were announced; they do not generally comply with C.P. requirements. C.P. ranges were not available at the time CR's test was undertaken. One of the six ranges tested was found, however, to have top burners with an average efficiency which would meet the C.P. requirement of 45 percent, and practically to measure up to certain other important C.P. requirements.

CP GAS RANGE REQUIREMENTS

Oven Requirements

CP 1—Oven shall reach 500°F from 70°F room temperature in 11 min. (Rate 39.1°F per min.)

CP 2—Ovens, when empty, shall maintain a minimum temperature of 250°F.

CP 3—Average surface temperature of oven exteriors shall not exceed 75°F above room temperature.

CP 4—Automatic oven burner lighter with automatic device to prevent escape of unburned gas shall be provided for each oven.

CP 5—An oven thermostat shall be provided.

CP 6—Heating of ovens from 70°F room temperature to 500°F shall require input of not more than 1600 Btu per cu ft of oven space.

CP 7—Maintenance of oven temperature of 500°F shall require not more than 3800 Btu per hour per cu ft of oven space.

CP 8—Oven vents shall discharge flue gases away from rear wall.

CP 9—Ball bearing rollers, or the equivalent, shall be provided on all drawers.

CP 10—Effective stops shall be provided for all drawers and racks.

Broiler Requirements

CP 11—Broiler temperature on combination oven and broiler ranges shall reach 600°F above room temperature within 15 min.

CP 12—Exposed broiler top surfaces shall not exceed a maximum temperature of 150°F above room temperature.

CP 13—An effective smokeless type of broiler pan shall be provided.

CP 14—Automatic broiler lighter with automatic device to prevent escape of unburned gas shall be provided.

CP 15—Minimum effective broiling area shall be equal to 50% of horizontal cross-sectional area of broiling compartment.

CP 16—Average broiler temperature shall reach 600°F above room temperature within 15 min with a rated hourly input less than 22,000 Btu per sq ft of broiling area.

Top Specifications

CP 17—Top burners shall be of dual purpose type for simmering. "High-Low" type burner valves are acceptable.

CP 18—One or more top burners shall have an input rating of 12,000 Btu per hour and shall have an output capacity sufficient to raise 5 lb of water 140°F in not more than 9 min.

CP 19—Automatic top burner ignition shall be provided for all top burners.

CP 20—Top burner heads shall either be constructed of rust-resisting metal or shall have a porcelain enamel finish.

CP 21—Thermal efficiency of standard gas range top burners shall be not less than 45%.

As promised in the earlier gas range report given in the June 1938 *Bulletin*, tests were made to determine comparative economy for long, slow cooking, of the insulated-well type of burner found in the *Chambers* gas range and of the new combination type of simmer burner known as the *High-Low* burner. The insulated-well type of burner, as its name implies, is an insulated compartment or well about ten inches in diameter going down to about thirteen and one-half inches below the working surface of the stove. There is a burner and rack inside and space for a utensil about nine inches in diameter and seven inches deep. The *High-Low* is not an insulated-well type of arrangement but a specially designed burner having one set of openings for a fast flame and a different set of openings, fewer in number, for a low or simmering flame. The fewer number of openings permit the flame to be easily adjusted to a slow rate of heating without danger of its going out. In the *High-Low* burner tested, the simmering flame which satisfactorily maintained a slow-cooking temperature consumed gas at less than one-tenth of the rate of the high-heat flame. CR's tests showed that there was no important difference in operating economy for slow, long-time cooking between the insulated-well type and the simmer-type burners. The *Thermowell* of the *Chambers* range does not, therefore, afford a reason for choosing this expensive range in preference to one equipped with a *High-Low* simmer burner.

This report on gas ranges is supplementary to the one issued in June 1938, the two ranges here discussed being the two on which delivery could not be obtained in time to be included with the tests of the ranges reported at that time.

In CR's test the ranges were carefully examined for quality of construction, and the top burners were tested for efficiency in bringing to a boil from a temperature of 68°F two quarts of water in a bright aluminum vessel. Burner efficiencies given in the listings are the average of efficiencies measured from both cold and hot starts, i.e., with the vessel put over the burner at the time it was lighted, and with the vessel placed on the burner after it had been operating for a time. Effectiveness of oven insulation and accuracy of the thermostat were also determined. Finally, each oven was given a practical baking test in which cookies were baked on cookie sheets in three positions in the oven. On the cookie baking tests, all the ovens, including those of the four ranges reported on in the June 1938 *Bulletin* for which the baking tests were not completed at that time, were judged satisfactory.

Average top burner efficiencies varied from 32 percent to 45 percent for the six ranges tested. This, at average gas rates, would perhaps amount to a yearly difference in operating costs of $6 or $8 in favor of the ranges with more efficient burners, and would amount to a greater difference if gas rates were exceptionally high. In the ovens, the amount of gas consumed to maintain a temperature of 500°F varied in the ratio of four to three, that is, the oven using the most gas consumed a third more than did the one using the least amount (oven sizes were approximately equal). At an oven temperature of 300°F the variation between the ovens was even greater, being approximately in the ratio of three to two. Each year the least efficient oven would probably cost the average family at least $2 to $4 more to operate than would the most efficient one. Unfortunately, the most efficient top burners and the most efficient ovens were not found on the same range.

In keeping with the fact that high price does not assure one of getting good value—something which consumers often forget—one of the most expensive ranges had inefficient top burners and, of all six ranges tested, consumed by far the largest amount of gas to heat the oven.

The prices given are list prices and may be higher than will be actually charged in many cases. Subscribers should understand that actual prices charged by dealers for many appliances will vary quite widely in different stores and in different parts of the country. (Consumers tend greatly to overestimate the uniformity or definiteness of the prices charged for nationally distributed articles.) As a matter of fact, it has been, in some cases, impossible to obtain from manufacturers of gas stoves any statement of the price at which a particular consumer would be able to purchase their product at retail; the maker frequently finds it expedient to allow his dealers considerable latitude in meeting local competition.

B. Intermediate

Detroit Jewel, No. HL68474D (Detroit-Michigan Stove Co., Detroit) $116. Burner efficiency averaged 45%. (Only the *Tappan* range, tested by CR in 1936, has been found by CR to have burners giving greater efficiency.) Rate of heat loss from oven greater than average of those tested. Oven thermostat inaccurate as received; when set at 300°F and 500°F, gave oven temperatures of 326°F and 528°F respectively; correction of this error could be made by an expert serviceman. The stove was not equipped with flue bonnet for attaching oven vent to flue, but flue bonnet appears to be obtainable from mfr. Oven dimensions: 12¾ x 15¾ x 20¼ in. Judged the best of six ranges in the series of tests reported in this and in the June 1938 *Bulletin*. Would have been rated *A* if oven had been more efficient. **3**

C. Not Recommended

Wedgewood, No. 1475E-OT (Jas. Graham Mfg. Co., 695 Bryant St., San Francisco) $117. Only range tested equipped with *High-Low* type of burners; two of the four burners were of this type. Though a relatively high-priced stove, burner efficiency was low, averaging 34%; rate of heat loss from oven was much greater than average and was indeed the highest of six ranges tested by CR. Oven thermostat, moreover, inaccurate as received, having errors of above 30° at 300° and 500°F; correction of this error could be made by an expert serviceman. The stove had provision for attachment of flue. Oven dimensions, 14 x 16 x 19 in. **3**

Corrections and Emendations to:
Annual Cumulative Bulletin
issue of September 1938

Col. 9 Meat: The statement referring to "not more than 3 percent moisture and...not more than 10 percent" in sausage, should be corrected to read "Uncooked sausage, etc., may contain not more than 3 percent *added* moisture and cooked or smoked sausage not more than 10 percent."

Col. 287 Shoe Polishes: *Mason's* Black Shoe Polish. The statement that *Mason's* Black Shoe Polish contained 3⅛ ounces is now incorrect. A new tin, which is shaped to deceive the purchaser as to its blacking content and has an exaggerated raised bottom, contains only 2¾ fluid ounces.

Col. 318 Furniture References: *The Identification of True Mahogany, Certain So-Called Mahoganies, and Some Common Substitutes—Bul. 1050.* CR learns that this publication is no longer in stock at the Government Printing Office.

Consumers' Research Bulletin
issue of October 1938

Page 5 Toothbrushes: *Takamine Scientific.* The addresses of the main offices of the chain of Whelan Drug Stores, Inc., listed as sellers of this toothbrush, are 806 W. 64 St., Chicago, and 330 W. 42 St., N.Y.C., or the consumer may apply directly to the manufacturer, the Takamine Corp., 132 Front St., N.Y.C.

Page 17 Men's and Women's Leather Shoes: The statement "The soles of Army and Navy officer's shoes have vegetable-tanned soles," should be changed to read "The soles of Army and Navy officers' shoes which meet U.S. Army and U.S. Navy Department specifications have vegetable-tanned soles."

Col. 402 Household Appliance References: Delete third line from the bottom which, through a printer's error, repeats the line above, and substitute the following: "...consumers' organizations and do not apply their funds ...," so as to read: ... are not consumers' organizations and do not apply their funds and energies strictly to consumers' problems.

* * * * *

IMPORTANT CORRECTION:

Col. 142 Astringents: *Pond's Skin Freshener.* Change listing from *C. Not Recommended* to *B. Intermediate.* The *C* rating was based on an officially published analysis by the chemist of a State Department of Health, which showed a carbolic acid content. An official of the State's Department of Health has now written the manufacturer that the published report was in error due to a clerical mistake, and that the product's analysis did not show any carbolic acid. CR has checked and confirmed this finding on a recent sample of the *Freshener* and on one known to have been a long time in dealer's stock.

Consumers' Research Bulletin
issue of December 1938

Page 1 Change Vol. 6 to read Vol. 5

Page 29 Bottom col. 1, top of col. 2. Local-Station High-Fidelity Receivers: *Philharmonic Linear Standard.* We are informed by letter from the manufacturer that the following prices are now current for certain sets available from the Philharmonic Radio Co.: 14-tube *Linear Standard* model (tested by CR) with dual low- and high-frequency speakers, $176 (previous cataloged price for this model, $156); 11-tube *Futura* model with dual speakers, $128. Record playing equipment for above sets about $30 extra. ¶Superheterodyne sets: 16 tube, $220; 20 tube, $245; 20 tube with complete phonograph equipment, $274. Prices quoted above (all types) are for sets without cabinets; cabinets are available at $39.50 up.

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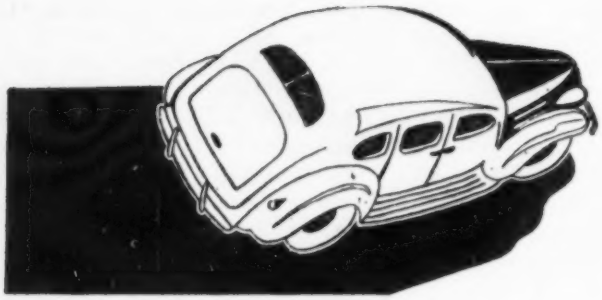
You Know But



What The Automobile Salesmen Say -

According to veteran automobile salesmen, who are credited with ability to sense quickly automobile sales trends, more prospective car buyers are now in the market than at any other time in recent years. With the outlook ahead pointing to what the automobile industry believes to be a "buying year," it behooves car buyers to scrutinize closely what they are offered for their money. The conveyor belts are humming at the present time, in comparison to recent years; the din of the automobile factories is again reaching a pitch which harbors hope for a prosperous year for the automobile industry. Wise buyers will none the less assay carefully the new car values before purchase. As in the past Consumers' Research offers the unbiased guidance which is necessary amid the hullabaloo of conflicting claims.

Let Us Suggest

Improvements in automobile values may be influenced, to some extent at least, by the persistent demand of intelligent car buyers for real engineering achievements—for fundamental improvements—instead of additional emphasis on "gadgets" which are of superficial importance. To that end it is very much to your self-interest to circularize—where circumstances permit—information concerning the availability of the *Automobile Bulletin* of Consumers' Research among your friends. Use the subscription blanks below.

Next month, February, subscribers will receive the confidential *Bulletin* on Automobiles for 1939—the eleventh *Bulletin* on automobiles issued by Consumers' Research over the last eleven years. Each year specific information on all makes of cars has been included, so that subscribers may have the necessary data available in order to make a wise car selection in terms of their needs and money outlay. The February *Bulletin* will present a well-rounded, intelligent discussion and appraisal of the new car models for 1939. It is "required reading" for a person who intends to buy a car and wants trustworthy information. Pass on this advance notice to friends who are not subscribers to Consumers' Research.

The questions listed on the right are the kind of questions which require correct answers in order to know 1939 car values. Among the cars rated in the February *Automobile Bulletin* are the following:

Plymouth	**Ford**
Chevrolet	**Graham**
Zephyr	**De Soto**
Pontiac	**Mercury**
Hudson	**Buick**
Studebaker	**Chrysler**
Dodge	**Willys**
Cadillac	**Nash**
Oldsmobile	**Bantam**
Lincoln	**Packard**

For New Subscribers

Consumers' Research, Inc., Washington, N.J.

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It is understood that my handling of any CR material which is marked "The analyses of commodities, products, or merchandise appearing in this issue are for the sole information of subscribers" will be in accordance with that direction.

Name.....
(Please write in longhand)

Street.....

City.....State.....

My profession or business is.....

CR-1-39

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Name.....
(Please write in longhand)

Street.....

City.....State.....

My profession or business is.....

CR-1-39

. . Tell Your Friends

Do such advertising slogans as, for example "Airfoam Ride with Autopoise Control," "The Car with the Weather Eye," describe new and valuable features in 1939 car models, or are they just some more of the automobile industry's classic come-on verbiage?

What radical changes have been made in automobile heating and ventilating?

What real advances in engineering, and genuine, practically useful improvements in automobile design, have been accomplished during the past year, and what models are affected by these changes? What are the principal changes in automobile bodies?

Is the Mercury "an entirely new car and a new value" as claimed?

Which cars depend on the unsafe method of using front springs to keep them going straight? What bad effect does applying the brakes have on such cars?

Which car—Ford, Chevrolet, Plymouth—is cheapest to operate on the basis of gasoline and oil consumption tests?

What improvements have been made in transmissions, a much neglected feature of the modern automobile? What revolutionary development—widely used in Europe—makes its appearance in America for the first time?

Are oil filters useful, or are they mainly a talking point? Which cars have them?

Independent wheel suspensions have appeared as standard equipment on most cars this year. Which cars are still without them? Are wheel suspensions all they're cracked up to be, or do they bring important hazards and disadvantages?

Which cars are equipped with generators properly controlled to keep the batteries up to charge?

Is the tire-overloading situation becoming worse? Which cars have overloaded tires?

What is the Warner Gear drive? Are overdrives increasing in popularity? Do they really make big savings in gasoline and oil?

Call Their Attention To The Automobile Bulletin

You are almost sure to hear discussed among your friends, at one time or another, some of the questions at the left—and sometimes with little or no light being shed. While the *Automobile Bulletin* next month will be confidential, the present *Bulletin*, including this announcement of the forthcoming *Automobile Bulletin*, is not. Show it to your friends if you like. You may use, of course, the questions at the left as an Automobile Quiz. Advise your friends that they may obtain the answers to these questions by filling out and sending in one of the subscription blanks on the opposite page, accompanied by proper remittance.

Use This Opportunity

The purchase of an automobile represents the investment of a substantial sum. The expenditure of so much money merits thorough investigation by the buyer of an automobile. In almost every case a friend is sure to recognize the value of your suggestion —subscribe to, and consult the *Automobile Bulletin* of Consumers' Research before buying a car. The *Automobile Bulletin* will be sent to all subscribers when issued next month.

The *Annual Cumulative Bulletin* for 1938, the handbook of buying containing over 200 pages summarizing CR's previous findings and rating more than 4,000 products, is still being sent, without additional charge, to all new subscribers. Since the subscription runs for one year, during which *Bulletins* are issued monthly (except during July and August), all subscriptions beginning with the February issue will also include the *Annual Cumulative Bulletin* for 1939, issued next September. Use this opportunity to further your own interest by forwarding the interests of the organization. More subscribers means more money for research and hence greater practical benefits to present subscribers. Please tell your friends how much they will benefit by subscribing to Consumers' Research now.

Here Are Subscription Blanks

Please Pass Them On To Friends

Have You Read

COD-LIVER OIL—FOOD, DRUG, OR POISON?

In the January Issue of *CONSUMERS' DIGEST?*

OTHER ARTICLES IN THE JANUARY ISSUE

- **Should Women Buy Used Cars?**
- **Low Cost of Decorating, by Donald Smith Feeley**
- **Only Saps Buy at Retail for Cash, by Paul Brindel**
- **What's Your Allergy?**
- **How Safe Is Aspirin? by George W. Fiero, Ph. D.**
- **Quality of Bakery Products, by Walter W. Scofield**
- **Sales and Cinderellas**

ARTICLES IN FORTHCOMING ISSUES

- **Pass the Pickles**
- **Hocus Focus, by Percival Wilde**
- **Midol—"Patent Medicine"**
- **Cold Cures—Money in Sneezes and Sniffles**
- **Little Digests, by Robert S. Knerr**
- **Bedspreads**
- **Auto Derelicts**
- **Chocolate Milk**

It's an article which should be read by every parent. It tells the plain truth about the use of cod-liver oil in the diet.

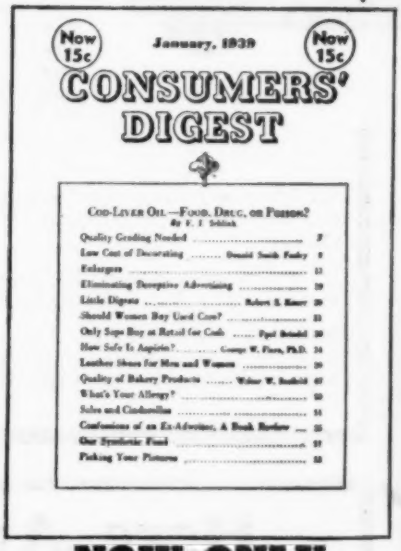
This is just a sample of the outstanding articles which appear in CONSUMERS' DIGEST every month.

This magazine, popularly priced, popularly written, brings together between its covers authoritative buying advice not easily found elsewhere—much of it published for the first time. It also provides a forum for the discussion of consumer facts and activities, and is essential to the person who desires to keep up with what's new in the field of consumer education.

Subscriptions to CONSUMERS' DIGEST, beginning with the January, 1939, issue, are reduced to half—from $3 to $1.50 a year. Begin your subscription with the January number.

SPECIAL RATES FOR THE CLASSROOM

Teachers are invited to write for information concerning the free Teachers' Manual and Study Outline and for special rates on group subscriptions for the school term now beginning. Write today.



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B1—39

Men's Shirts

Two events have recently occurred which promise to give some help to consumers who purchase men's shirts. One event was the promulgation by the Federal Trade Commission of new trade practice rules (free copy obtainable from the Federal Trade Commission, Washington, D.C.) on the shrinkage of woven cotton fabrics and garments; the other event was the proposal by the National Bureau of Standards of Commercial Standard TS-2565 (free copy obtainable from the National Bureau of Standards, Washington, D.C.) for measurements of men's shirts.

According to the new rules of the Federal Trade Commission, which went into effect June 30, 1938, it is now an unfair trade practice to use such terms as "full shrunk," "preshrunk," or "shrinkproof," to intimate that a fabric will not shrink if this is not so in fact. If such words as "preshrunk" or "shrunk" are used in describing a garment or fabric, the percentage of additional shrinkage, if any, must be stated. Needless to say, this ruling, if enforced, will eliminate one of the customary ways of misleading the purchaser and is greatly to the advantage of consumers. They should aid in its enforcement by bringing violations to the attention of the Federal Trade Commission. Measurements of the shirt when new should be made by the purchaser and a record kept for comparison with measurements made after the shirt has been laundered a few times.

Standard minimum measurements for men's shirts exclusive of work shirts are tabulated in the Bureau of Standards' Commercial Standard TS-2565. The table is reprinted for convenience of the consumer who perhaps wants to discover why the shirt-tail of his new shirt doesn't stay tucked in, or why the buttons fly off when he takes a deep breath. If he should find that the measurements fall short of the minimum values given in the table, he would be justified in returning the shirt and asking for a replacement. It should be noted in this connection that skimping of measurements is very common in the textile trades. Competition is so keen that manufacturers frequently avail themselves of fractions of an inch in dimensions, to permit them to compete in low price lines.

Standard Minimum Measurements for Men's Shirts

(All Measurements are in Inches)

STAMPED NECK BAND SIZES	(A)	14	14½	15	15½	16	16½	17
CHEST, Total circumference	(B)	42	44	46	48	50	52	54
FRONT, Length of	(C)	33	33	33	33	33	33	33
BACK, Length of	(D)	33	33	33	33	33	33	33
ARMHOLES, Length around curve	(E)	19½	20	20½	21	21½	22	22½
SLEEVE, Width around	(F)	14¾	15¼	15¾	16¼	16¾	17¼	17¾

In measuring a shirt, it should be laid out flat, without tension, on a smooth surface. The measurements A to F, referred to in the table, and in addition the measurement G, or the sleeve-length, are made between the points indicated in Figures 1 and 2. To obtain the right size in buying a shirt, the purchaser should ascertain whether allowance has been made for shrinkage; if not, he must choose a larger size. Usually a half-size larger neck size will be enough to allow for the shrinkage, but a whole size larger will be needed in a few cases where shrinkage is exceptionally large.

METHOD OF TAKING MEASUREMENT

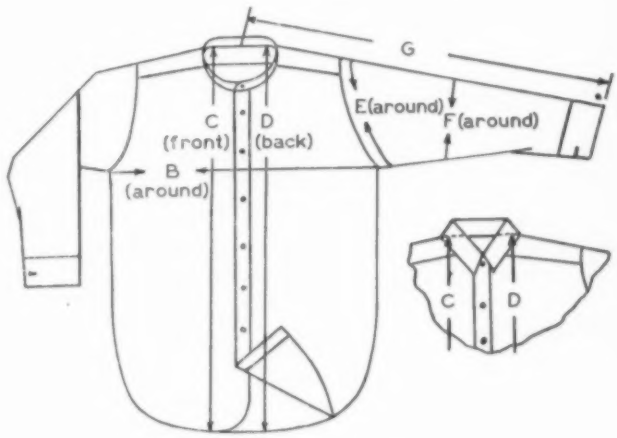

FIGURE I

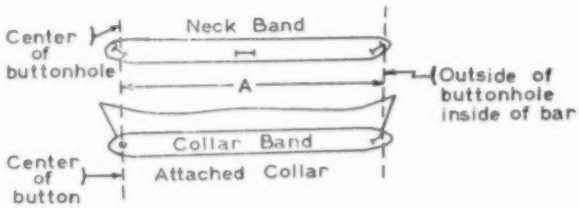

FIGURE II

It has been estimated that three-quarters of men's shirts are made of broadcloth. The remainder are made from madras, Oxford, percale, and many other fabrics. Broadcloth is a plain weave fabric but, due to its heavier filling yarns, has approximately twice as many warp as filling yarns to the inch. The most common broadcloths have thread counts 144 x 76, 136 x 60, and 128 x 68. Both carded and the preferable combed yarns are used. Yarns may be two-ply in both warp and filling, two-ply in warp and single-ply in filling, or single-ply in both warp and filling. The best broadcloth is made of two-ply yarns of mercerized combed cotton, and good quality in broadcloth is invariably associated with high thread count. Unfortunately, due to an old trade custom, thread count is not taken under

conditions which apply to the use of the material by the consumer but with the cloth in the condition known as "the gray." This thread count differs from the count of the finished fabric, being more in the warp and less in the filling by roughly 4 or 5 percent, i.e., finishing increases the thread count of the warp and decreases the thread count of the filling by that amount approximately. Breaking strength of good broadcloth should be not less than 75 pounds per inch in the warp and 30 pounds per inch in the filling.

Madras is a closely woven, "square" (as many threads to the inch in the filling as in the warp), plain-weave cotton fabric with woven-in patterns; these patterns are usually striped. Oxford is a medium-weight basket-weave cotton fabric, two yarns being woven as one in the filling, sometimes also in the warp. Percale is a "square," plain-weave smooth cotton fabric, often printed, but never with designs woven in.

An informative shirt label or wrapper might state:

1. Size 15", sleeve length 33": Size measurements fulfill requirements given in Commercial Standard TS-2565.
2. Fabric: 144 x 76 broadcloth; 2-ply warp, 2-ply filling. Combed cotton. Mercerized. Minimum breaking strength 75 pounds in warp, 35 pounds in filling.
3. Shrinkage: Preshrunk—further shrinkage will not exceed 1 percent.
4. Stitching: All stitching is done with No. 60 3-ply thread having a minimum breaking strength of 1.95 pounds. Minimum of 23 stitches per inch in armhole seam, cuff, collar, and front plait. Minimum of 20 stitches per inch in yoke, side-seam, and bottom hem.
5. Buttons: 7 ocean pearl buttons on shirt front; 1 on each cuff.
6. Colorfastness: Will not fade appreciably when laundered 30 times according to standard commercial laundry methods or when exposed 40 or more hours in the standard Fade-O-Meter test.
7. Workmanship: Buttonholes and seams are well made. No visible raw edges of fabric or loose ends of threads.

The unfortunate thing about this interesting and informative label is that it doesn't exist in the market place, for no manufacturer as yet has thought it expedient to reveal the quality of his methods and materials so candidly to consumers. This imaginary label, however, is an example of what the manufacturer, aiming to serve the consumer above all, will tell his customer in that not-so-far-off future when consumers' wishes will have great influence in the market place. The suggested label describes a good-quality broadcloth shirt—one that would be Grade A in a standard system of shirt grades. Similarly detailed information giving minimum specifications met by the shirt should be shown on the label or on the wrapper of every shirt, and would enable the purchaser to know something of the value of what he is buying. (For illustration of specifications applied to another consumers' commodity, see report on gas ranges in this *Bulletin*.)

Twenty-five shirts were tested by Consumers' Research. These included, besides those bought by CR in the open market, a number of shirts submitted in duplicate by Cluett, Peabody and Co., Inc. Costs of the tests of the shirts submitted by Cluett, Peabody and Company were borne by the company, the tests being made in accordance with the conditions set down by CR in sections 23 and 24 of the *Introduction to Consumers' Research*. In several cases two or three samples of the same shirt were tested. Test results were in very good agreement for the different samples of the same shirt, with the exceptions of *Arrow Hitt* and *Arrow Dart* which showed considerable variation between samples.

Compared with what a first-rate shirt should be, the shirts tested were in the main poor. In part, this was due to the fused[1] collar which nearly every shirt had. Most of the shirts rated *B* gave only about half the service which a good shirt would give. Many of the shirts shrank excessively when laundered. Owing to faults being so nearly universal, the standards for shirts to be rated *B* were set lower by CR than would have been the case if the shirt industry had progressed to the point of maintaining quality control in manufacturing. It is more and more evident that the textile industry needs a great deal more engineering, and technical and engineering controls. It might, in CR's opinion, very well discontinue enough of its advertising for the next five or ten years to permit it to take over some such advances in technical development as those which characterize such young and progressive industries as electric refrigerators or automobile manufacturing.

In the test to determine lasting quality of the shirts, each shirt was worn one day and then laundered; the procedure was repeated until the shirt showed serious signs of failure. In the listings, statements in regard to durability refer to the results of this test. The number of launderings before a shirt was judged to have failed varied from 16 for the poorest shirt to 48 for the one having the longest useful life. The shirts were also tested for breaking strength of fabric and for shrinkage; all were found satisfactory in these respects unless otherwise noted in the listings. Since they were purchased before the Federal Trade Commission's rules on labeling of shrinkage went into effect, they were not checked for compliance with these regulations. Shirts were of broadcloth unless otherwise stated and with but two exceptions, as noted, had fused collars. Ratings are cr 38.

A. Recommended

Real Silk (Real Silk Hosiery Mills, Inc., Indianapolis, Ind.) $2.65. Regular (not fused) collar. Collar shrank to 3/8 in. smaller than marked size, considerable for a shirt of this grade. Durability (lasting quality) very good, shirt giving approximately double the resistance to wear and laundering of those shirts having durability reported as fair. Not a silk shirt as the name might imply. **3**

[1] Fused collars are of a type which hold their stiffness without the use of starch, a result achieved by fusing cellulose acetate threads into the collar.

B. Intermediate

Fruit of the Loom (Eclipse-Needles Co., Eighth and Dauphin Sts., Philadelphia) $1.65. Sleeve shrank to 1 in. shorter than marked size. Durability good, but fusing of collar was lost in laundering, which accounts perhaps in part for the good durability. **1**

Lion "Robert Taylor" (M. Nirenberg Sons, Inc., 1140 B'way, N.Y.C.) $1.89. Madras. Collar shrank to ½ in. below marked size. Sleeve shrank to 1¼ in. shorter than marked size. Durability fair. **1**

Longwear (Distrib. New Process Co., Warren, Pa.) 3 for $3.50. "Preshrunk"; collar shrank to ⅜ in. below marked size. Durability rather poor. Fair value, considering low price. **1**

Lord Pepperell (Pepperell Mfg. Co., Boston) $1.65. *Sanforized shrunk.* Collar shrank to ⅜ in. below marked size. Sleeve shrank to 1¼ in. shorter than marked size. Durability fair. **1**

Piccadilly (Piccadilly Shirt Co., 12 N. Paca St., Baltimore) $1.39. Collar shrank to about 1 in. smaller than marked size. Per dollar of cost, would afford the most service of any of the shirts tested. Care, however, must be taken when purchasing to allow for excessive shrinkage. **1**

Towncraft (Distrib. J. C. Penney Co., chain stores) $1.49. Preshrunk. Durability fair. **1**

Tru-Val (Tru-Val Mfrs., Inc., 261 Fifth Ave., N.Y.C.) $1.35. "Preshrunk"; collar shrank to ⅜ in. below marked size. Breaking strength of fabric somewhat low. Durability fair. **1**

B. Intermediate (contd.)

Arrow Dart (Cluett, Peabody & Co., Inc., Troy, N.Y.) $2.25. Durability of one of two samples, good; of other sample, poor. **2**

Arrow Hitt (Cluett, Peabody & Co., Inc.) $2. *Sanforized shrunk.* Durability of three samples tested varied from poor to good. **2**

Jayson (F. Jacobson & Sons, Inc., 1115 B'way, N.Y.C.) $2. Sleeve shrank to 1¼ in. shorter than marked size. Durability fair. **2**

Jayson (F. Jacobson & Sons, Inc.) $2. Percale. Sleeve shrank to 1 in. shorter than marked size. Durability fair. **2**

Manhattan (The Manhattan Shirt Co., 444 Madison Ave., N.Y.C.) $2. Durability fair. **2**

Saks & Co., N.Y.C. $2. Fused collar of one of two samples blistered after 12 launderings; of other sample, shrank to ½ in. below marked size. Durability fair. **2**

The Nobility, Cat. No. 35—210 (Distrib. Sears, Roebuck & Co.) $1.89 plus postage. Collar shrank to ⅜ in. below marked size. Durability fair. **2**

Van Heusen (Phillips-Jones Corp., 1225 B'way, N.Y.C.) $2. Labeled "Won't shrink"; only a small amount of shrinkage found. *Van Heusen* woven collar (not fused). Durability fair. **2**

C. Not Recommended

R. H. Macy & Co., Inc., N.Y.C. $2. Fused collar of one of two samples blistered after 6 launderings. Durability otherwise fair. **2**

INNER-TUBE REPAIR KITS

ALTHOUGH most people nowadays probably rely on automobile service stations for their tire repair work, nearly everyone who drives an automobile has had occasion to buy at times one of the inner-tube repair kits consisting of a piece of specially prepared rubber patching material, a tube of rubber cement, and a crude file or scratcher, usually incorporated in the lid of the container. Besides their intended use for closing up holes in automobile inner tubes, the materials are of course applicable to repairs of any household article of rubber, such as hot-water bottles or rubber boots, which has a surface which can be suitably prepared and on which the thickness of the patch would not impair the usefulness of the article.

Since a rubber repair kit is likely to be purchased for an emergency repair and to be kept for a considerable period of time before being used again, the aging properties of the materials are particularly important. Failure of a patch on an inner tube is most likely to occur through poor adhesion, resulting in "creeping" of the patch and eventual re-opening of the leak. It has been reported to us that difficulty may be experienced with this type of patch when used on inner tubes subject to the extremes of heat likely to be encountered, for example, on southern roads during the summer. If much of this type of driving is anticipated, it might be well to make use of the so-called vulcanized or "hot" patch.

Fifteen samples of fourteen brands of kits were subjected to tests to determine the effectiveness of the patch, using the materials as received and again

after aging in the laboratory. A patch was made by applying the materials to a piece of inner tube in accordance with directions given on the container; the patch was then cut into two sections, one of which was aged in an oxygen bomb tester for a period approximating the effect of several years of ordinary aging. A sample of the patch rubber not yet applied to the piece of inner tube was also aged for an equal time and afterwards applied to the inner tube rubber. The three samples thus prepared, representing the conditions *as received*, *aged after patching*, and *patched after aging*, were then subjected to a test for accurate determination of their adhesion, the force required to strip off the patch being noted. It was found that some of the patches separated by peeling off, and also in some cases by tearing away of the patch material from the inner tube rubber.

As might be expected of any rubber goods, differences in the aging qualities of the rubber were found. Well-known brand names, of famous nationally advertising makers, proved to be no assurance of goodness. *Goodyear*, *Firestone*, and *Atlas* (Standard Oil) were all found among those which did not perform well. Firestone's patch showed the poorest performance of the fifteen brands tested, although it was second highest of the kits tested in unit cost based on price and area of material, and five times as expensive on this basis as the best performing brand.

Aside from differences in the strength of the resultant patch, the principal differences of importance among the kits were in the amounts of patching materials furnished. The amount of materials varied over a rather wide range, corresponding to a notably large difference in unit cost per patch, or per unit of area. The price rating of the kits was determined by the cost per square inch of patch rubber supplied. All kits contained a supply of rubber cement and patch materials as noted. Prices of course were found to differ at different stores for the same kit. Prices given in the listings were those *actually paid* by a retail purchaser. All ratings are cr 38.

A. Recommended

Lee Reddy Patch Junior Repair Kit (Lee Tire & Rubber Co., Conshohocken, Pa.; sold by S. S. Kresge stores) 10c. One sheet of patch material 8 x 3 in.; ten cut patches 1¼ in. square. Adhesion strength as received and after aging, highest of all kits tested. Adhesion strength of patch aged after applying was above average. Was also one of the lowest in unit cost of the kits tested. **AA1**

Cities Service Tube Repair Kit (Distrib. Cities Service Stations) 15c. One sheet of patch material 4 x 3 in.; six cut patches 1¼ in. square. Adhesion strength of patch aged after applying, highest of all tested. Adhesion strength of patch rubber tested as received and after aging was about average. **2**

B. Intermediate

Except as otherwise stated, performance of kits rated *B* was about average.

B. Intermediate (contd.)

Kingston Super Quality Rubber Back Patching Outfit, No. 10283 (Distrib. Harrison Wholesale Co., 851 W. Washington Blvd., Chicago) 25c. One sheet of patch material 18 x 4 in. Adhesion strength as received, above average. Effect of aging somewhat greater than average. **1**

Miller New Handy-Andy Repair Kit (Miller Rubber Co., Akron, Ohio; sold by F. W. Woolworth Co.) 20c. One sheet of patch material 5 x 12 in.; twelve cut patches 1¼ in. square. Adhesion strength of patch aged after applying was above average. **1**

Wards Tube Repair Kit, Cat. No. 61—1307 (Distrib. Montgomery Ward & Co.) 27c plus postage. One sheet of patch material 7⅜ x 6 in.; ten cut patches 1¼ x 2 in., and twenty-five cut patches 1⅜ in. square; one casing blowout patch which was not tested. Adhesion strength as received, somewhat below average. **1**

Chicago Tube Repair Kit (Sold by Cities Service Stations) 20c. One sheet of patch material 8¼ x 3 in.; six cut patches 1-3/16 in. square. Adhesion strength of patch aged after applying was above average. **2**

Goodrich, No. 3 Tube Repair Outfit (B. F. Goodrich Co., Akron, Ohio) 15c. One sheet of patch material 8 x 3 in. Adhesion strength as received, above average, but effect of aging somewhat greater than average. **2**

Bowes Seal-Fast Ready Cut Patches (Bowes Seal-Fast Corp., Indianapolis, Ind.) 25c. One sheet of patch material 4½ x 3 in.; one cut patch 1 x 1⅞ in., and four cut patches 1 in. square. Highest in unit cost of all kits tested. Adhesion strength of patch aged after applying was above average. **3**

Flash Combination Bevel Edge Tube Repair Kit (Flash Laboratories, 411 N. Wolcott, Chicago) 25c. One sheet of patch material 6 x 3 in.; nine cut patches 1-3/16 in. square. Of same make and price as *Kingston*, and closely similar in performance to it, but contained less than half the area of patch material. **3**

Miller Handy-Andy Tube Repair Kit, No. 1 (Miller Rubber Co.) 25c. One sheet of patch material 10 x 2½ in. Adhesion strength as received, considerably below average. **3**

Peerless Tube Repair Kit (United States Rubber Co., Inc., Passaic, N.J.) 20c. One sheet of patch material 8 x 3 in. Adhesion strength as received, below average. **3**

C. Not Recommended

Materials of following kits showed poor aging qualities.

Cross Country Tube Repair Kit, Jumbo Size, No. 1044 (Distrib. Sears, Roebuck & Co. retail stores) 29c. Adhesion strength of the patch as received was satisfactory; when aged, strength of patch was poorest of all tested. **1**

Goodyear Tube Repair Kit (Goodyear Tire & Rubber Co., Akron, Ohio) 25c. **2**

Atlas Tube Repair Kit (Atlas Supply Co.; distrib. Standard Oil Co. of Indiana service stations) 18c. **3**

Firestone, No. 0 (Firestone Tire & Rubber Co., Akron, Ohio) 25c. Adhesion strength, both as received and of patch aged after applying, poorest of all brands tested. Per unit of area of material furnished, this brand was five times as expensive as *Lee Reddy Patch*, the best brand tested. **3**

PHOTOGRAPHIC ACCESSORIES: THE PHOTOFLASH SYNCHRONIZER

On account of the high cost involved, the most common and familiar use of the photoflash synchronizer is in the field of news photography; the amateur to whom the expense is not of moment, however, will find it adaptable for many other purposes. For portraiture, the use of flash bulbs will often result in a more "natural" expression, because the sitter may be posed under a normal light and the flash bulb exploded at the moment when he wears the desired expression; flash bulbs used in a room provided with normal illumination are less dazzling to the sitter than an equivalent in photoflood lamps. There is the further advantage that they place no heavy load on the wiring system as do photofloods; thus there is no likelihood of blowing fuses. Flash-type bulbs give a high intensity of light over a very short interval of time (of the order of 1/25 second for standard bulbs) by the burning of aluminum foil or magnesium wire in a sealed bulb containing oxygen at a pressure below atmosphere. Ignition is effected by the explosion of a fuse wire igniter connected to a source of electricity such as a battery of small dry cells. Flash-type bulbs can be used without any connection to the power lines and hence will serve in camps, at various sports events, or in locations where utilization of the regular current supply is impracticable. In this respect flash-type bulbs differ from flood-type bulbs; the latter operate only from the regular current supply and are similar to ordinary electric light bulbs, except that they are of high wattage (250-500) and have high illumination efficiency (associated with very short working life, averaging about 2½ hours; the maker claims 6 hours maximum life for the *G.E. No. 2*). By use of a multiple-flash assembly, such as is sold by Mendelsohn for use as an accessory with their speedguns, bulbs may be so distributed as to give any desired type of lighting and so avoid the "flat" effect often produced by one flash at the camera position. (The *Mendelsohn* multiple-flash assembly is sold at $10 for 110-volt service; $12 for the battery-operated type.) With this equipment for portrait work, regular 50-watt lamps can be placed in the reflectors and the lighting balanced as desired. The 50-watt bulbs are finally replaced by flash bulbs and the flash set off by the synchronizer.

The amateur who aspires to extravagant and dramatic lighting effects, as seen in theatrical and moving picture productions, will use flash bulbs as a matter of economy, because in no other way can such a volume of light be produced without expensive fixtures, wiring, and equipment; for most work, however, there can be no doubt that it will cost the amateur far more to use flash bulbs than flood bulbs. As to the synchronizer, the amateur interested in so-called "candid" (unposed) photography may well consider that instrument indispensable.

The foregoing is not by any means intended to imply that photoflash synchronizers and flash-type bulbs are infallible, for even with the best synchronizers failures will occur. First, there is the failure of the bulb to fire at all, which will result in a spoiled plate, as well as loss of the picture, if other light is present at the same time. This type of failure may be caused by a defective bulb; inquiry among dealers and news photographers indicates that the average is about 8 to 10 "dud" bulbs per thousand. Other causes of failure of flash-type bulbs to go off are to be found in the synchronizer and its associated equipment. The battery may be run down so that insufficient current is supplied to the bulb; there may be a poor contact either in the synchronizer switch or in some of the connections—this could have the same effect as a worn-out battery. Attention should be given frequently to the matter of tight connections and clean contacts; freedom from dust and corrosion is important.

Another type of failure is the occurrence of the brightest instant of the flash slightly before or slightly after the opening of the shutter, thus giving an underexposed film. The cable release of the camera is often the cause of trouble; its action may be changed by so slight a cause as the amount of curvature which it has at the moment the release is pushed. (Often a cable release gives trouble, without use of a synchronizer.) For this reason, a synchronizer of the type which releases the shutter by means of a magnetic tripper is to be preferred. Shutter action, too, can sometimes be erratic, due to dirt or, in some cases, to exceptionally severe climatic conditions. In extremely cold weather, for example, failures may be experienced because the thin leaves of the shutter have frozen together, or extreme cold may have affected certain delicate parts of the synchronizer tripping mechanism.

Assuming a properly designed and correctly adjusted synchronizer and a shutter in proper operating condition, pictures taken with flash bulbs may fail due to lack of uniformity of bulbs, which is probably unavoidable under the conditions of manufacture in mass production. For this reason, the long-peak slow-flash bulbs are to be preferred; of these, the larger sizes are best, as they give a longer "peak" than the smaller ones, but they are about four times more expensive. This type of failure is the source of much grief among news photographers because there is no way in which the operator can tell whether or not he has a correctly exposed film; if not, he has lost the picture—possibly one very important to his paper—and wasted the film and the bulb.

The only apparent possibility of solution of this difficulty seems to lie in the possible adaptation of the photo-cell to the synchronizer in such a way that the initial light from the bulb shall affect the photo-cell, permitting an amplified current, sufficient to actuate a magnetic shutter release, to pass. This would overcome failures due to non-uniformity of bulbs, but difficulties of design might be en-

countered. Charts supplied by the makers of *Superflash* bulbs indicate that the elapsed time from ignition of the bulb to the peak of the flash is only in the vicinity of 0.02 second; this is at best a short time for an electrical impulse released by a photocell to be converted into a mechanical impulse and trip a shutter, especially in an instrument which must stand hard use and abuse and be exposed to varied conditions of jolting and temperature.

With the advent of the *Wabash Superflash* bulb, and the later Nos. 7 and 15 *Mazda* flash bulbs (both with a long peak), the use of synchronized flash with *Leica*, *Contax*, and similar miniature focal-plane cameras becomes practical. For this use, the *Abbey M/M Flashgun* and the *Mendelsohn Speedgun*, Universal Model, are believed to be the best. For a focal-plane shutter of long travel, as in the 3¼ inch x 4¼ inch *Graflexes* and larger models, use of the synchronizer is not practical with the present bulbs because the total elapsed time required for the slit to travel across a plate of such width is greater than the duration of the peak period of the flash. There is a rumor in the trade that a new bulb (or bulbs) will soon be available, with sufficiently long period of peak illumination to permit synchronization with the larger focal-plane shutters, such as *Graflex*, etc. Focal-plane cameras using the No. 120 and No. 127 films are border-line cases; a synchronizer should be purchased only with the understanding that it is returnable if it fails fully to expose the entire negative area in a uniform manner.

A. Recommended

Abbey Press Flashgun (Abbey Photo Corp., 305 E. 45 St., N.Y.C.) $18.75; additional charge of $1.50 for use with U-front cameras. For *Speed Graphic* and other folding-bed cameras. Can be installed by user. 6-in. parabolic reflector supplied is adjustable to all bulb sizes. A new model at the same price, designed for the recently introduced 2¼ x 3¼ *Speed Graphic* camera, has been announced. CR is not yet in a position to report on this model. **2**

Mendelsohn Speedgun, Model C (S. Mendelsohn, 202 E. 44 St., N.Y.C.) $12.50 complete; additional charge of $2.75 for installation on U-front cameras. Very similar to the *Abbey Press Flashgun*. Equipped with 7-in. adjustable reflector. **2**

Abbey M/M Flashgun (Abbey Photo Corp.) $20.75 complete. An all-electric synchronizer with magnetic tripping device. Intended for the smaller cameras having shutter releases on the camera-body. Does not depend upon a cable release but acts directly on the finger release of the camera. **3**

Mendelsohn Speedgun, Universal Model (S. Mendelsohn) $25 complete. For use on all cameras. Very similar to the *Abbey M/M* except that a kinkless metal cable release is used. **3**

B. Intermediate

Kalart Micromatic Speed Flash (The Kalart Co., 915 B'way, N.Y.C.) $13.50; Senior Model, including 9-volt battery case, larger reflector, and extension cord, at $16.50. Can be fitted to most cameras; some few cases require a special fitting, others a special model of *Kalart*. Considered less satisfactory than the magnetic tripper type. Some may wish to delay a projected purchase of a *Kalart* pending the availability of specifications and performance data on the recently announced improved model. **2**

Jacobson Synchronizer (Irving Mfg. Co., 1537 N. Hoover St., Hollywood) $25. For use on *Speed Graphic* only. Magnetic type similar in principle to the *Mendelsohn* and *Abbey* synchronizers. **3**

Jacobson Synchronizer (Irving Mfg. Co.) $25. For use on *Leica*, *Contax*, etc. Shutter release operated directly by the finger-operated plunger; a switch simultaneously operates the flash. **3**

C. Not Recommended

Ley Synchronizer (Ley Photolite Co., Chicago) $6.50. Not a true synchronizer in the sense of the previous listings, but a device making electrical contact as the cable release button is pressed. A synchronizer more or less limited in application to circumstances where shutter can be set at one second; hence, serviceable for pictures in a dark or dimly lighted space. **1**

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The following are not recommended, mainly for the reasons given in last paragraph of text:

Mendelsohn Speedgun, Model "G" (Graflex) (S. Mendelsohn) $12.50. For *Graflex* cameras only. Operates only at speed of 1/50 second with focal-plane shutter on "open" and mirror down. The mirror mechanism, when released, makes electrical contact as mirror comes to "up" position. **2**

Synchroflasher (Robert W. Smeaton, 1837 N. 59 St., Milwaukee) $15 installed less battery case. For *Speed Graphic* cameras only. **2**

HOME BUILDING

II

Concrete and Masonry

THIS is the second of a series of articles on home building scheduled to appear in CR's monthly Bulletins. *Forthcoming articles will discuss, in sufficient detail for most consumers' purposes, the specific uses of materials entering into the construction of a building, roof and wall construction and coverings, floors and floor coverings, heat and sound insulation, doors and windows, interior trim and cabinetwork; a bibliography will also be provided of important references on the subjects treated.*

CONCRETE is made from cement, "aggregates," and water. It is one of the cheapest and most practical materials for curbs, walks, basement floors, and foundations. It can be made strong and durable.

Plain concrete (unreinforced) is not suited for many uses commonly recommended, because of its low resistance to stresses other than compressive forces. Expansion and contraction due to temperature changes will produce cracks. Freezing when wet causes deterioration. Concrete absorbs dampness and, unless a moisture barrier is provided, it will transmit moisture from an earth layer below to anything in contact with it. Large rugs on concrete floors have been found to absorb several pounds of moisture over a period of a few weeks.

Cement. Portland cement is the most widely used and uniformly manufactured of cements. There is some variation in quality among the various brands but in most instances manufacturers comply reasonably well with standards of the American Society for Testing Materials. For *ordinary* building work the purchase of Portland cement without regard to trade name will be satisfactory.

Waterproof cement, so called, is normally Portland cement with an admixture of calcium stearate, tannic acid, oil, or diatomaceous earth. Results obtained are, however, unreliable and as the cost is increased by as much as 30 percent over that of Portland cement, use of waterproof cements is not recommended. Necessary waterproofing of concrete should be obtained by increasing the proportion of Portland cement, or by applying a waterproofing coat such as asphalt to one surface of the concrete.

High-early-strength Portland cement contains a high lime or alumina content, or it may be very finely pulverized Portland cement. It remains plastic a normal length of time, about 45 minutes, then hardens and gains strength very rapidly. It is advantageous for use where high strength is desired in two to three days as opposed to a month for Portland cement concrete. Its cost is higher than for Portland cement. It possesses no advantage to the consumer except where construction must be hurried or work is being done in cold weather; high early-strength cement requires but a brief period of protection from freezing during hardening.

There are also hydraulic cements which harden under water, puzzolan cements similar to those used centuries ago by the Romans, slag, natural, tufa, white Portland, and other special cements. White Portland cement permits interesting architectural effects either in its natural color or with color pigments added. Current price of Portland cement is said to range from 50 cents to $1.50 per bag of 94 pounds (1 cu ft) depending upon location and quantity purchased.

Aggregates. Sand, gravel, cinders, slag, or other inert particles make up the aggregates in concrete. They should have strength and durability at least as great as the binding material and they should be of such a character that the binding material will adhere to the face of the particles. Aggregates are termed "fine" or "coarse," depending upon whether they will pass through a ¼-inch mesh screen. They help increase bulk, workability, or strength, and sometimes decrease cost.

Cleanness is highly important. Natural aggregates unfortunately may include impurities from natural sources, such as clay, loam, silt, and organic matter. Thorough washing and screening, even to remove stone dust from crushed material, are necessary. Organic matter resulting from the decaying of leaves, bark, and animal or vegetable matter is more detrimental than inorganic impurities; as little as one-tenth of one percent is damaging.

(a) *Sand.* Clean, hard, strong, durable, uncoated grains are required. Finely divided clay well distributed and in amounts up to 10 percent of the total aggregate has but little injurious effect and, by filling up voids, may make the concrete more waterproof; however, clay which has formed a coating on sand particles, so that the cement paste has no contact, is very detrimental.

Sand may be tested for silt in the following manner: Place 2 inches of the sand to be tested in a quart fruit jar, then fill the jar up to a point 2½ inches from the top with water. Fasten the cover and shake the contents thoroughly for one minute. Allow the contents to settle until the water is clear; sand goes to the bottom and the silt settles on top of it. If there is ⅛ inch or more of silt, the sand from which the sample was taken should be washed before it is used in mixing concrete.

The presence of organic (animal or vegetable) matter in sand is determined by a color test; it is normally used only when trouble is being experienced in getting concrete to harden properly. Vegetation which forms tannic acid upon decomposing is particularly troublesome in this respect.

A three percent solution of caustic soda is required for the color test and is made by dissolving one ounce of caustic soda (sodium hydroxide) in a quart of clear water, preferably distilled. This solution should be kept in a glass bottle tightly closed with a rubber stopper. [*Caution:* Don't handle sodium hydroxide with moist hands; it may cause very serious burns. Also take care not to spill the solution, which is highly injurious to clothing, leather, and many other materials.] The test is as follows: Into an ordinary 12-ounce prescription bottle, such as druggists or physicians use, place the sand to be tested, up to the 4½-ounce mark. To this, add the 3 percent solution of caustic soda until the 7-ounce mark is reached. Stopper the bottle, shake the contents carefully but well; set aside for 24 hours. At the end of this time the color of the liquid will indicate whether the sand contains dangerous amounts of organic matter. If the liquid is colorless or has a light yellow color, the sand may be considered satisfactory in so far as organic impurities are concerned. If a dark-colored solution ranging from dark reds to blacks is obtained, the sand should not be used unless it is washed and a re-test shows that it is then satisfactory.

Sand should be well graded, that is, it should contain particles of all sizes ranging uniformly from the finest to the largest. By such grading, the finer particles fill the spaces (voids) between the larger particles, resulting in an economical use of cement.

Most gravel banks contain more coarse particles than are desirable for good grading and hence should be screened and the portions mixed for best results.

When making purchases from a washing and screening plant by weight, it is advisable to make certain that the high water content of wet sand is not bought at the same price as the sand; purchases by volume may be more desirable. Clean, well-graded sand costs from 85 cents to $2.50 per ton, depending upon location and quantity.

(b) *Gravel.* Size of gravel particles normally used in concrete runs from three-eighths to two and one-half inches. Like sand, gravel should be well graded and should have a high degree of cleanness. Crushed stone or gravel (¾ to 1½ in.) costs, per ton, approximately the same as sand.

(c) *Rock.* In thick walls or large masses of concrete, clean field stones or brickbats may be incorporated as the concrete is poured, provided they are placed well away from the surface.

(d) *Cinders.* The use of cinders is not recommended because of their undesirable porosity and variable quality. On large jobs subject to close technical supervision, however, cinders may prove satisfactory.

Other aggregates. Asbestos fiber, various chemicals for creating gas-voids, sawdust, cracked ice, or snow, have been used to produce concrete of light weight and heat-insulating quality. But the needs of the average consumer call for the strongest, most water-resistant concrete possible under field conditions; such concrete should be of maximum density. Crushed slag, air-cell clay pellets, the by-products of certain chemical processes, and other lightweight aggregates are available in a few localities, but these aggregates add to first cost without sufficient compensation to make them of much value to the average consumer.

Mixing water. In general, water that is fit to drink is suitable for mixing with cement. Water that is clean and free from oil, alkali, or acid is considered suitable for concrete work. Organic matter and sulphates are injurious. Sea water has been used with apparent success but its use is not encouraged, lacking further data; it should never be used in reinforced concrete because of corrosive action on the steel.

Proportioning. Proportioning of concrete on large or important engineering structures has become a highly specialized study. The average small concrete job should use the following relatively simple principles, which will produce good concrete.

Whatever proportions of cement, sand, and coarse aggregate are used, the least possible amount of water should be added which will permit workability and thorough mixture. The criterion is to have just enough plasticity of the mix so that, with thorough tamping or vibration, the concrete will become a solid mass without "honey-combs." Excess water reduces strength and is apt to wash away the cement; it is never a substitute for energetic tamping.

The common method of proportioning concrete is by volume. The proportions are varied according to the character of the work. For consistent results, measurements of volume should be made with care. One sack (94 pounds) of cement is one cubic foot in volume. The following arbitrary proportions are typical, but may need some slight adjustment in order to obtain the best mixture with any particular combination of sand and coarse aggregate.

Relative Proportions by Volume

Use	*Cement*	*Sand*	*Coarse Aggregate*
Walls or foundations and one-course floors and walks	1	2	4
Columns, or members requiring greater strength	1	1½	3
Massive work	1	3	6
Two-course floors, walks, etc.			
First course	1	2½	5
Second course	1	2	none

After the addition of water, mixing must be continued until the concrete is uniform throughout and all particles are covered with cement paste. Customary time for mixing by machine mixer is two minutes. Mixing by hand will take much longer, depending upon the means used.

In some cities, ready-mixed concrete is available. This is mixed at a central batching and mixing plant, and is transported in special trucks with revolving cylinder containers which continue mixing while in transit, thus avoiding setting of the concrete. Such service is excellent in principle, but the cost may be prohibitive for small users. Ready-mixed concrete in quantities of 50 cubic yards or more of 1 : 2 : 4 mixture (delivered) costs from $6.75 to $8.50 per cubic yard. Prices are higher for smaller quantities.

Reinforcement. Steel reinforcing bars are made "deformed" to permit an artificial bond with the concrete. Reinforcement serves to improve resistance to tension stresses, to relieve internal stresses caused by contraction or expansion during temperature changes, and to tie a mass of concrete together as a whole.

Expanded metal mesh or wire fabric serves not only as reinforcement for stucco but affords a support to which the mortar is keyed. This will be discussed in a subsequent article under the heading "Exterior Wall Coverings."

Reinforcement of walls, foundations, floors, and other concrete work is recommended.

MASONRY

Masonry materials possess many excellent qualities which justify their position of favor through the centuries; but they also possess important limitations. Stone, brick, hollow tile, pre-cast concrete

blocks or tile, and various other building elements—classed as "unit masonry"—are heavy, bulky, and costly. Masonry, unless it is reinforced and specially designed, is not adapted to earthquake-resistive construction and hence should not be used in areas likely to be subject to intense earthquakes. (Incidentally, it is the present view that no part of the United States can be considered as certainly immune from the possibility of destructive earthquakes.) Masonry "barriers" help confine fires fed by combustible materials—but only for periods much more brief than is generally admitted. Also, during a fire, four brick walls may reflect heat, increase temperature, and serve as a chimney, thereby increasing loss within a building itself. Some of the severest fires have been in supposedly "fireproof" buildings of brick or reinforced concrete.

In an address before the National Association of Public School Officials at the Hotel Astor in New York City, August 23, 1934, Mr. T. Alfred Fleming, of the National Board of Fire Underwriters, declared that there is no such thing as a fireproof building. Concerning schools reputedly fireproof, he stated: "Within twelve minutes the average school fire will reach a temperature of 1800 degrees (F), sufficient to dehydrate concrete and disintegrate steel." The advantage of the ability of incombustible materials to confine fire originating or spreading in wood flooring, beams, partitions, furniture, linoleum, draperies, papers, books, etc., within a given area, is a matter of *time* (minutes) only.

Good masonry construction, moreover, requires skilled craftsmen whose services come high, as a rule, being in one of the major classes of "rigid" or "sticky" prices referred to by modern economists and New Deal "explainers" of our 1937-38 or New Deal depression.

Stone. "Strong, durable, and cheap" is the description of older authorities, but stone is so seldom cheap that it has come to be considered the aristocrat (often, indeed, the snob) of building materials. In homes built for speculation, stone is frequently used to achieve a salable pretentiousness suggesting high quality which may be belied by all other parts of the structure (i.e., the structural frame, plumbing system, or heating plant) which are hidden and, therefore, not readily rated at their proper worth by a prospective purchaser.

Stone walls are of necessity very thick. Unless they are properly finished, they may be and may remain, even during dry weather, very damp on the inside, and due to their great absorption capacity for radiant heat may give the dwellers in such a room a persistent sense of being cold even when the air temperature is normal at 68° to 70°F or even considerably higher. Since stone used for construction may absorb rather large quantities of water, the type of stone under consideration should be carefully investigated for water absorbency. Granite is quite moisture-resistant (about 200 times more so than common brick), and so are, to a lesser degree, slate, marble, trap, and gneiss rock. Limestone and sandstone are relatively porous although more resistant to moisture than common brick. Any of the stones named, or one equally moisture-resistant, should be selected if one contemplates building with stone masonry. When using the more porous building units it is considered good practice to use a granite base or at least one course of granite or of other damp-proofing material extending through the wall and slightly above the ground line. (For damp-proofing of masonry walls, the reader may refer to *Dampness in Masonry Walls Above Grade—Letter Circular LC 514.* Free from National Bureau of Standards, Washington, D.C.)

A stone wall, particularly of cut stone well laid by a competent stone mason, is usually very expensive. The only exception to this is in localities where good building stone is available on the building site or adjacent premises and at the same time the cost of building labor is rather unusually low.

Selection of the kind of stone for building construction should be based on its durability, porosity, and cost (the latter meaning, of course, the cost delivered beside the excavation, ready for the masons).

One type of stone construction with much to recommend it in localities where stones of good quality and of approximately the right size are available, is known as the Flagg method. Briefly stated, the wall is laid up against wooden forms. Selected stones are laid against a form and ordinary concrete is placed from behind. This really makes a concrete wall with stone facing set in the concrete. Relatively good results may be obtained by this method without the services of skilled stone masons, but some study of the problem and a degree of skill or experience in building such a wall will be a great advantage.

Used as a veneer, limestone will cost from 90 cents to $1.10 per square foot in place. Sandstone is slightly higher. The following are mentioned as producers of building stone:

Limestone: Indiana Limestone Co., Bedford, Ind.
Sandstone: Briar Hill Stone Co., Glenmont, Ohio.
Synthetic Stone: "Rostone." Rostone Corp., Lafayette, Ind.
Travertine: P. Grassi & Co., 445 Bayshore Blvd., San Francisco, or 5325 Stewart and Gray Roads, South Gate, Calif.

Brick. A brick is a block formed from hard dense clay or shale and burned at a high temperature in a kiln. Good brick should ring when struck with a hammer, be manufactured to accurate dimensions, and break evenly under the rap of the trowel or when dropped. Three general classes are: common, face, and firebrick. There are, of course, many other clay products produced by manufacturers, including brick for special purposes, such as paving, sewers, etc.

So-called "common brick" are most generally used. They are quite porous. Select common brick are those that have been sorted to obtain uniform color. Face brick are specially formed and processed during manufacture to provide a more

dense (and less porous) surface or special colors or textures; face brick are normally used for the facing of walls composed of common brick, hollow tile, wood frame (brick veneer), or concrete. Enameled and glazed brick are special face brick which have been given a vitreous surface, as their names indicate. Firebrick are used for fireplace linings or where a refractory brick is needed.

In brick work, as in all masonry construction, water absorption is an important consideration. The infiltration of water and wind through brick walls, especially "veneered" walls, may be serious in some climates. This is frequently due not only to the brick but to the mortar, and may arise from the use of inferior mortar, failure to moisten bricks before placement in order to reduce brick-suction of the mortar, or the application of strong acid in cleansing the face of a finished wall. The following bricks are arranged in order of decreasing porosity: common brick (most water-absorbent), sand-lime common brick, face brick, enameled and glazed brick (water-repellent; the mortar may, however, transmit moisture). For damp-proofing masonry walls the reader should refer to *Letter Circular LC 514* of the National Bureau of Standards, previously given as a reference.

Good brick should not effloresce in the wall. Efflorescence is a whitish deposit formed by the evaporation of moisture which has carried soluble salts from the interior of the brick to the surface. Barium salts added to the clay before baking will reduce efflorescence. Gypsum contained in the Portland cement used in mortar may be a cause of efflorescence; the addition of ammonium or calcium stearates to the mortar in an amount equal to 2 percent by weight of cement or lime will help to prevent efflorescence due to the mortar. Efflorescence may be removed from a dry wall by scrubbing with a dilute solution of muriatic (hydrochloric) acid [*Caution*: poisonous to breathe, and caustic to the skin], using a fiber brush, then washing thoroughly with water, drying, and applying a saturated solution of zinc sulphate; efflorescence, however, may reappear later as moisture carries soluble salts to the surface.

Good brick cannot be selected by appearance only. The American Society for Testing Materials has provided standard grades specifying strength; the larger manufacturers can submit evidence and should therefore be required to state whether their brick conforms to such specifications. A guaranty of such conformance should be required of the successful bidder as a part of the specifications for the building.

Air-cell and hollow brick and large slab brick are being experimented with to lessen weight and lower construction costs. The consumer is cautioned, however, to be wary in becoming at his own expense a "laboratory" for such experimentation.

Reinforced brickwork has much to recommend it. As in concrete, reinforcing-steel serves to tie together the various elements and to increase resistance to tensile stresses. A special brick is used, with a notch or diagonal corner to take the reinforcing bars. Such construction is designed on the same principles as reinforced concrete; it may be designed to be earthquake-resistive. Although its cost is high, it may be advantageously employed in chimney construction where seismic forces must be taken into consideration.

The cost of laying brick makes their use expensive, ranging from 1½ cents each for common brick to 4 cents each for face brick, depending on the number of corners, openings, height above ground, and character of handling equipment. Veneer requires 7 bricks per square foot of wall; face brick veneer in place costs 35 to 70 cents per square foot. A solid 8-inch wall of common brick requires 14 bricks per square foot and costs, in place, 35 to 45 cents per square foot of wall surface. The cost of common brick varies widely—for example, from $9.50 per thousand (Dallas) to $20 (Seattle).

Proper bonding is necessary to develop the full strength of brickwork. "Stretchers" are brick laid lengthwise; "headers" are brick laid across the wall to tie the wall together. Innumerable patterns or "bonds" are in use. One of the most practical is common or American bond, which consists of continuous headers every fifth or sixth course, with four or five courses of continuous stretchers between.

In densely populated areas, destruction of old brick buildings has made available much salvage brick, selling for as little as $5 per thousand. Such bricks, if originally of good quality, mortar-free, and containing few brickbats (broken brick), are a good buy for use in walks, garden walls, etc. When crushed, good quality salvage brick make a satisfactory aggregate for use in concrete for floors, driveways, etc. But it is difficult, and in some cases impossible, to clean salvage brick sufficiently to obtain adequate bond with new mortar for use in a structure as important as a dwelling.

The following are mentioned as brands of standard brick believed to be satisfactory: *Belden* (Belden Brick Co., Canton, Ohio); *Chicago Common* (Illinois Brick Co., 228 N. La Salle St., Chicago); *Cinnabar* (Gladding Bros. Mfg. Co., San Jose, Calif.); *Claycraft* (The Claycraft Co., Columbus, Ohio); *Hanly* (Hanly Co., Face Brick Division, Bradford, Pa.); *Hytex* (Hydraulic-Press Brick Co., Central National Bank Bldg., St. Louis, Mo.); *McNear* (McNear Brick Co., 419 Rialto Bldg., San Francisco); *Simons* (Simons Brick Co., 1195 S. Boyle, Los Angeles); *Tapestry* (Fiske Brick & Granule Co., 137 Newbury St., Boston).

Selection of local or other brands should be made on the basis of strength, porosity, uniformity of manufacture, and cost. The opinion and experience of local builders may be sought in cases where information available appears insufficient to serve as a basis of purchase.

Hollow Tile. Loadbearing tile, partition tile, terracotta tile, and similar names signify hollow or cellular burned clay (or shale) building units. These, particularly if stamped "loadbearing," are suitable for partitions and for vertical loads; but all hollow tile construction is extremely hazardous when

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subject to intentional or accidental horizontal stresses. Experience in the catastrophic failures of tile-constructed buildings during the Long Beach, California, earthquake in 1933 was sufficient to eliminate all further construction with hollow tile in that area.

Good-quality tile has qualities similar to those of good brick. Rate of laying is faster than for brick, and moisture resistance of the individual units is higher due to the air cells between surfaces, reducing direct water seepage and water storage, and permitting some degree of ventilation. Types are "cube" unit, "interlocker" (T-shaped) unit, "rectangular" unit, and "universal" (Z-shaped) unit. The cube and rectangular units are normally less expensive than the other types.

Aside from strength considerations, factors which prevent a more extensive use of hollow tile are: variation in size of units that are theoretically the same, raising cost of laying and plastering; breakage in shipment and handling, because of brittleness; tendency of dealers in building materials to stock only a few standard shapes, thus requiring brick fill-ins which negate the advertised advantages of hollow tile construction. Due to irregularities in the tiles themselves, mortar joints are likely to be so thick that moisture penetration will be excessive in spite of the hollow cells. Unlike brick, hollow tile lacks salvage value.

Hollow tile with special glazed surfaces is not recommended because it is easily chipped and broken.

Typical costs of tile, in place, are: 4-inch partitions, 14 to 17 cents per square foot of wall surface; 8-inch partitions, 26 to 30 cents per square foot; single course loadbearing tile, 29 to 33 cents per square foot. Cost of partition tile, 4 x 12 x 12 inches, loose, runs from $80 per thousand (Atlanta) to $140 (Seattle).

Manufacturers of tile believed to be good are: National Fireproofing Corp., 100 Fulton Bldg., Pittsburgh; Metropolitan Paving Brick Co., Canton, Ohio; Pacific Portland Cement Co., 11 Sutter St., San Francisco; Pomona Tile Mfg. Co., Pomona, Calif.

Glass Tile. Glass tile is a relatively new structural element. Each block is made from two glass "boxes" sealed together to form a hollow block which receives a partial vacuum during manufacture. Edges are given an abrasive-like finish for mortar adhesion.

The prospective purchaser who is considering the installation of glass-tile windows should consider the following points: (1) openings must be considered as "filler" walls, i.e., the weight of the building and superimposed loads must be carried entirely through other portions of the building frame; (2) such windows cannot be opened to admit sunlight or fresh air—ventilation must be provided by means of other windows or by a mechanical ventilation system; (3) insulation against heat (or cold) and sound is afforded by the cells, but mortar and edges of tile are good conductors; (4) direct vision through the window is impossible—this may be an advantage in screening off the gaze of passers-by, but can be equally a disadvantage in obstructing the view of the occupants of the room.

B. Intermediate

Insulux (Owens-Illinois Glass Co., 307 Madison Ave., Toledo, Ohio) Admits light through hollow "hob-nailed" blocks.

Pyrex (Corning Glass Works, Corning, N.Y.) Similar to *Insulux* but made from heat-resistant glass with low expansion and high strength. Blocks 11¾ x 11¾ x 4 in.

Other Masonry Units. Pre-cast cement blocks of various patterns have merited considerable use for basements, foundations, and walls. A poured block, made of good concrete—Portland cement, sand, and coarse aggregate—has the characteristics of the concrete itself; but as unit masonry it may take advantage of the fact that form work is eliminated on the job. The hollow spaces hinder passage of moisture, but the mortar joints, of course, are not completely watertight. A pressed cement block, on the other hand, formed by pressing in a mold a moistened mixture of sand and cement (but without any of the coarse aggregate used in poured blocks) is apt to be, in comparison with a poured block, a poor commodity. If well made, however, the pressed blocks are useful and comparatively inexpensive building material.

Other masonry units are cement brick, sand-lime block, and cinder block. The last-named is used for walls above ground level because of its relatively high insulation value, toughness, and fair nail-holding capacity, a very advantageous feature and one sadly lacking in many otherwise desirable types of permanent construction. Cinder blocks also provide adequate bond for plaster and stucco. The sand-lime block has characteristics similar to those of the sand-lime brick: strength, regularity, and low water absorption.

Small concrete bricks or blocks are easily handled but are actually more costly in place than the larger slab units. Since the average brick or block is both stronger and more moisture-resistant than its mortar joint, it is obvious that a minimum of joints is desirable. On the other hand, very large masonry units are so heavy and easily damaged that cost and danger to workmen in handling offset any savings or advantages which might otherwise be achieved by their use. Slabs of lightweight concrete and gypsum are made for roofs, floors, and partitions, or for installation away from direct exposure to the weather; only the gypsum partition tile is suited for use in small structures.

Subject to variation according to locality, cost of standard cement blocks, in place, is about 20 cents per square foot of wall surface; standard (8 x 8 x 16 inches) cinder blocks, in place, cost about the same.

MORTAR

The following materials are used for mortars in masonry construction (plasters, stucco, etc., made

of similar materials, used for exterior and interior wall coverings, will be discussed in subsequent articles):

Dry So-called Ready-Mixed Mortars. These mortars are factory-mixed cement and lime, designed to eliminate the necessity for proportioning on the job. Sand and water are added just prior to using. They cost more than mortars mixed on the job from basic materials but they are much more reliable than mortars mixed "by guess."

Two brands believed to be reliable are *Peerless* (Peerless Cement Corp., Free Press Bldg., Detroit); *Brixment* (Louisville Cement Co., Speed Bldg., Louisville, Ky.).

Lime. Lime putty is used in the mixing of lime mortars. It is economically made from lump quicklime (calcium oxide) but before use requires considerable time to season with exposure to the air after addition of water. It is the "fattest" of the limes, that is, it will carry more sand. Lump quicklime has a great affinity for water before "slaking" and generates much heat (involving some risk to the workmen) as water is added.

Pebble lime and "process" lime are crushed quicklime, furnished packaged in moisture- and air-proof bags. To produce good lime putty, they must be mixed and seasoned in the same manner as lump quicklime.

Lime mortar is composed of lime putty and sand, the amount of sand depending upon the carrying power or fatness of the lime used. The ordinarily accepted proportion is 1 volume of lime putty to 3 volumes of clean, well-graded sand. The use of straight lime mortar, however, has been abandoned in some parts of the United States especially subject to earthquakes; in others, it appears to be on the wane, possibly hastened by activities of cement interests in association with building control officials. It should be noted that lime mortar was almost universally used in ancient buildings, a large number of which are today in a good state of preservation.

Cement-Lime. A mixture of Portland cement, lime putty, and clean, well-graded sand produces a good mortar. When the lime putty content is equal to or exceeds that of Portland cement, by volume measurement, the mortar is known in the trade (the nomenclature is quite misleading) as *cement-lime* mortar; when the proportion of lime putty is less, the mortar is *cement* mortar.

Mortar performs many functions. It must provide a uniform bearing for the masonry units and should bind them together into a mass which is strong and weather-resistant. It should fill all joints for maximum resistance to penetration of moisture and hot or cold air infiltration. It must have the strength and adhesion necessary to carry imposed loads and resist displacement of any of the units. For brick, stone, and cement-block work below ground level, a cement mortar made of one part cement and three parts sand is usually recommended. For work above ground level, such as ordinary brickwork, lime is generally substituted for a part of the cement, often for 50 percent and not infrequently for more. There is a good deal of difference in opinion of various authorities as to the most desirable proportions; recommended proportions depend to some extent upon type of masonry construction used. Local requirements or regulations for construction should be consulted.

▲ Ref: *Mortar.* Obtainable at 5 cents from Structural Clay Products Institute, Washington, D.C.

▲ *Recommended Minimum Requirements for Small Dwelling Construction.* National Bureau of Standards, 1932. 10c from Supt. of Docs., Washington, D.C.

▲ *How to Avoid Faulty Concrete in Small Structures,* 1932 (Extension Series No. 27). 50c from Eng. Extension Dept., Purdue University, Lafayette, Ind.

▲ *A Practical Course in Concrete,* by Henry Giese. Apply to Portland Cement Assn., 33 West Grand Ave., Chicago.

An Honest Advertising Man Speaks His Mind

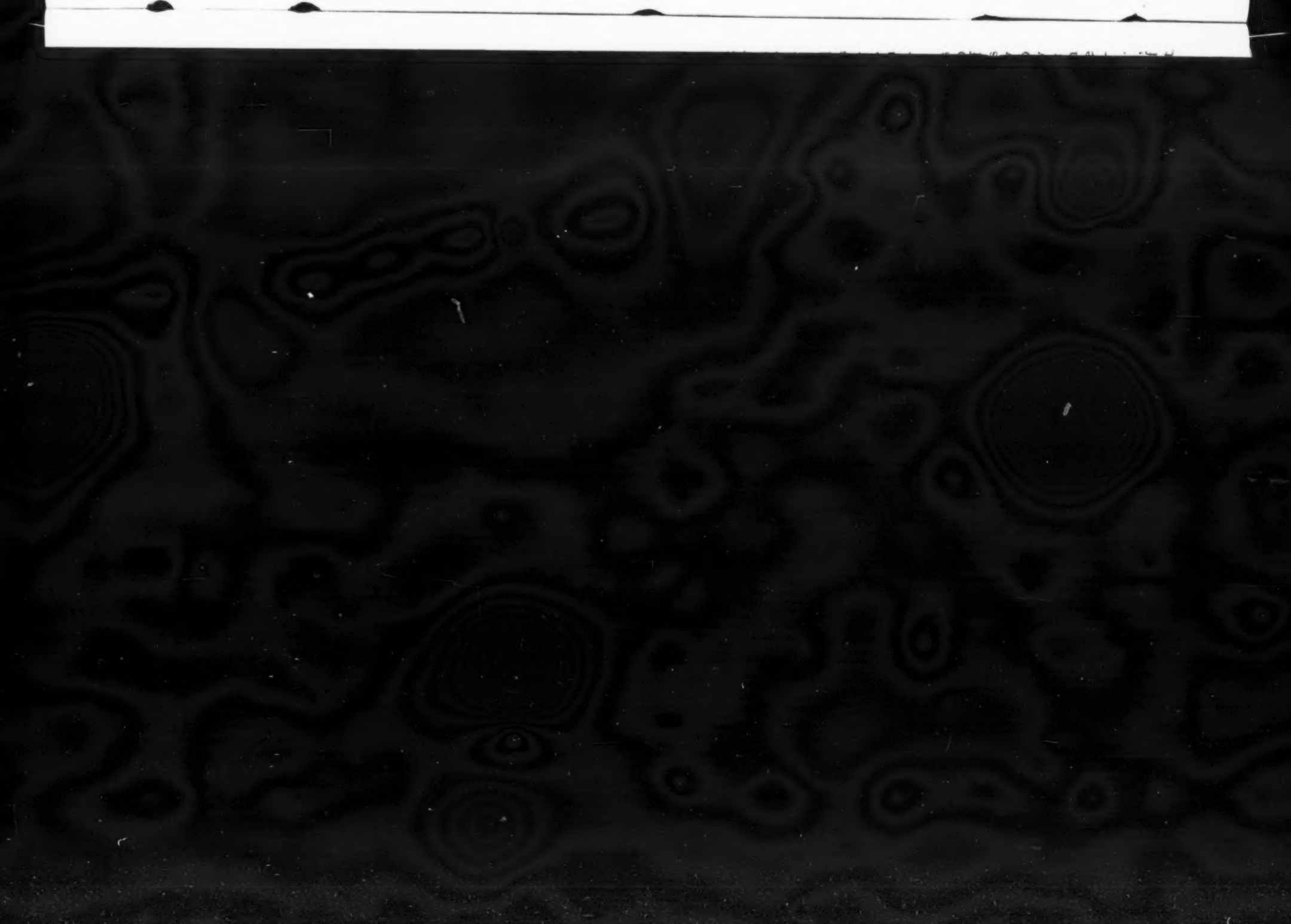
THE following letter received by Consumers' Research from one of its subscribers is self-explanatory. The name and address of the subscriber are omitted for obvious reasons.

Oct. 15

Consumers' Research, Inc.

You are rendering a most valuable service—a d... sight more than Good Housekeeping Institute or any other magazine's so-called testing laboratory. To these people, *all* electric refrigerators, *all* stoves, *all* devices made by the right people, especially national advertisers, are good—no qualification. Have just been reading the Good Housekeeping Institute's Buying Guide of Feb. 1, 1938, and should judge there is not very much made in the United States in those categories of commodities in which Good Housekeeping issues approvals which doesn't rate their approval. (Swell for the advertising boys!) Their explanation on page 2 of what "tested and approved" means is ludicrous.

In his closing remark, our correspondent refers to the large number of words which are used to convey no specific information about the nature of the test and the standards used—such phrases as "standards which are kept as high as they possibly can be within reason....Capable of doing its job efficiently and economically." (Just how efficiently and how economically, in dollars or cents per year or per utilization?) In the case of a vacuum cleaner, for example, it is absurd to approve the *Westinghouse* and *Premier Duplex* without indicating their relative effectiveness, especially when out of a group of vacuum cleaners tested by CR, it was found that the *Premier Duplex* was one of the two lowest in dirt-removing ability and was at the same time among the noisiest.



THE CONSUMER LEARNS ABOUT ADVERTISING, AGAIN

JUST a few weeks ago one of the world's largest refiners advertised a truck running over 300,000 miles without replacing pistons, pins, crankshaft or bearings—not even adjusting the bearings, and claiming this amazing record was the result of using its petroleum products. Your editors took the trouble to investigate this particular truck and learned that it had three sets of pistons and rings—and how any service man put in replacement pistons and rings without touching bearings or pins is more than we know. No experienced service man would believe such an advertisement because he knows better. Maybe the copy writer twisted the story or didn't actually mean what he said, but the fact remains that to a truck owner or non-technical man it was "higher'n a church steeple and skinnier'n a broomstick."

When these products do not produce the advertised magic results, who gets the blame? Seldom the product and never the advertiser—but always the service man. When a service man recommends repairs and replacement parts he has a double selling job to do. He must first UNSELL the owner on the hokum he hears daily on the radio, sees in magazines, newspapers and billboards, and then sell him on his own service and parts.——From a recent automotive trade journal.

Our heading for this article might equally well have been: "Remember, If You Believe Their Claims, The Men in the Trade Don't."

Maybe next time CR subscribers read such an advertisement they will know what discount to apply in order to arrive at the truth. In this case it will be seen that 100 percent is pretty close to the right figure. It is surprising how many advertisements can be disposed of by a simple application of common sense. Common sense would tell that no such claim as that in the quoted advertisement could be made honestly for a particular refiner's oil, for the advertisement says nothing of a series of other trucks using competitors' oils, each running a stated number of miles before replacement of pistons, pins, crankshafts, or bearings. Without a comparison, the claim is obviously meaningless since there is no telling but some truck might have gone *much farther* on some other refiner's oil, assuming for the purpose of this test of admen's logic that the claim of 300,000 miles is a plausible one. Note the trade journal's comment that no experienced serviceman would believe such an advertisement "because he knows better." The writer of this item forgot, however, to say that the serviceman believes other lying or misleading advertisements. It is interesting and true that the serviceman does fall for many a misleading ad. It just takes a different line of bunk, usually presented in more technical phraseology, to convince him, than would suffice to persuade the average ultimate consumer.

INSIDE INFORMATION

By
The Old Hoss

WE ARE LIVING in a complaining age. If we do not complain about the past, present or future governmental activities we are considered out of step with the modern trend. People even complain about their food. It seems that "Pure Food Laws" protect those who find it very profitable to "improve" food by adulterating it. We are now eating coal tar flavored cake, candy, ice cream and fountain syrups, glucose and pectin jellies and jams, flavored and colored with who knows what; beef house butter, boiled milk which rots in the bottle before it sours naturally, nitre dipped meats, cereal filled frankfurters, cheese az iz not cheese, oak leaves or what-not masquerading under the euphoneous name of "Orange Pekoe" whatever Orange Pekoe may mean or be, unsmoked "smoked hams" from Chi treated with "pyroic" something or other instead of real hickory smoke, imported olive oil from Georgia cotton fields, "Summer bologna" made of guess what outside of smoke-flavored sawdust, a sort of an edible linoleum. We can soon expect synthetic celery, coal-tar eggs, spinach made of treated burdock leaves, but they will never find a substitute for salt mackerel. So let us not complain!

We are now suffering from a "Can Epidemic." Don't be surprised to see your laundry or dry cleaning come back to you in cans. Or to buy potatoes by the can instead of the bushel, or to read where your clothing store advertises "Arctic Brand, All Wool Overcoats in Five Gallon Cans."

It is said that the Scotch are "canny" but we have them out-canned a million ways. Some day some public dining spot is going to advertise as follows... "We do NOT serve any article of food which comes in cans" and when they do they will earn the eternal gratitude of a can-cursed public. It seems that we are more interested in "canvenience" than in real quality. Well, they cannot can "Pie a la Mode," "Banana Splits" or scored ice. So let us not complain!

—Roscoe Lawrence in the *Morning Free Press*, Easton, Pa.